Acknowledgements

Permits Optimization Project

Final Report

April 2004

South Florida Water Management District

Prepared by

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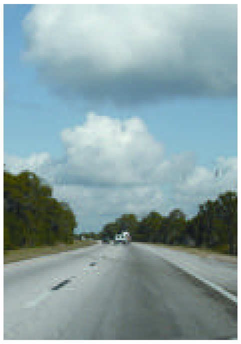


Clearly, mandated monitoring will increase dramatically at the District. The purpose of this Permits Optimization Project was to:

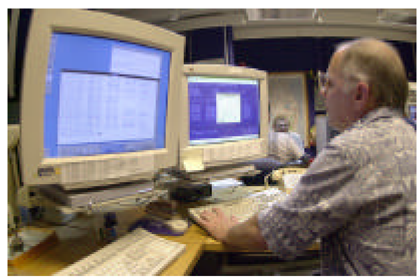
• Look for opportunities to organizationally streamline, internally, the process used by the District to obtain permits.
• Review existing permits and make recommendations to optimize permit requirements in terms of number of parameters, frequency and number of stations.
• Make recommendations for future permit monitoring of CERP components and other District projects.

The South Florida Water Management District (District) is rarely exempt from obtaining permits for the construction and operation of its works and projects, and must adhere to the terms and conditions of those permits or be subject to enforcement action and penalties. In addition, Federal and State environmental laws have placed an increased emphasis on water quality, which in turn have increased the District's monitoring responsibilities.

The District complies with a multitude of permit-required monitoring and assessment work for biological, hydraulic, hydrologic, hydrogeologic, and water quality parameters. With the ongoing modifications to the Everglades Construction Project, the creation of the Comprehensive Everglades Restoration Plan (CERP) projects with their individual monitoring plans, and the construction of other capital and Federal–State projects, the amount of permit-required monitoring is already increasing measurably. It is also expected that some or all of the CERP components' individual monitoring plans will be incorporated into permit conditions required for the design, construction and or operation of those projects.

Authorization

In June 2003, the District retained the Jacobs/MWH Joint Venture to prepare a Situation Assessment Report and to assist the Director of the Permits Optimization Project. In October 2003, the decision to complete the recommendations from the Situation Assessment Report was made. Many of the resources needed to complete the work involved the assistance of many District staff. A detailed description of the team formed to accomplish the optimization of permits is found in Section III "Methodology and Results."



The District manages the water resources of South Florida within its 16-county jurisdictional area. An integral component in the management of District water resources relates to construction, operation and maintenance of structures and projects within the 16 counties. Associated with "construction, operation and maintenance" are permits that the District must obtain that mandate associated monitoring requirements. In addition, future CERP project elements will require varying degrees of Federal, and/or federally-delegated authorizations prior to initiating construction and/or operation (C&O).

Monitoring Programs and Costs

In order to understand the opportunities that may be assessed for optimizing the permit-required monitoring programs it was necessary to define the permit-required monitoring requirements and associated costs in a way that would be useful for later optimization routines. Excel® spreadsheets were constructed for each of the major permit-required monitoring programs. These cost models were then populated with regional unit cost information obtained from previous studies, reports and the District's initiative to estimate the true costs for the long-term EFA Program.

Monitoring Programs Cost Models

After reviewing all permits that the District had obtained, it was determined that eight projects, some of which have multiple permits, made up the majority of the permit-required monitoring expenditures. These eight projects are:

- Stormwater Treatment Area 1 West (STA 1W).
- Stormwater Treatment Area 2 (STA 2).
- Stormwater Treatment Area 5 (STA 5).
- Stormwater Treatment Area 6 (STA 6).
- The Holeyland Project.
- The Non-ECP Program.
- The Lake Okeechobee Operating Permit (LOOP).
- The 1991 Settlement Agreement.

All of these projects are required to have detailed water level, flow and quality monitoring programs by either permits or court order. Within the cost models developed are detailed data listing the name of each permit-required monitoring station as well as the frequency and number of parameters to be sampled. The task for this report was to develop optimization recommendations for the first six of these projects. The LOOP and the Settlement Agreement programs were reserved for a later study effort.

For each of the first six major programs, unit costs were estimated and these values were applied to the cost models in order to capture the sampling frequency and parameter variations. The cost models, which are in the form of Excel spreadsheets, can be used to estimate the costs associated with:

- Deleting a station.
- Adding a station.
- Reducing the frequency of collection.
- Increasing the frequency of collection.
- Reducing the number of parameters analyzed.
- Increasing the number of parameters analyzed.
- Changing the parameters analyzed.

The cost models developed can be used to test the cost effectiveness of various optimization options and "what-if" scenarios.

Current Permit-Required Monitoring Costs

Using the cost models, the costs associated with the current permit requirements can be estimated. The cost of permit-required monitoring for the six major programs is estimated to be:

- STA 1W $489,190
- STA 2 $843,574
- STA 5 $620,614
- STA 6 $199,545
- Holeyland $25,989
- Non-ECP $695,036
- Total FY04 costs for six programs = $2,873,948

This total matches the computations recently completed for the long-term Everglades Construction Project by the District staff.

Options to Reduce Permit-Required Monitoring Costs

The task of optimizing the permit-required monitoring networks required identification of the criteria and processes by which the District can move forward with the regulatory staff to modify those monitoring requirements.

Management Options

The optimization of permit-required monitoring programs will involve the modification of the programs by three basic criteria:

- **Number and Location of Permit-Required Monitoring Stations**
  The draft study of the Coastal Water Quality Monitoring Network by District staff used a statistical evaluation approach to ascertain the relevance of each station in relation to other adjacent stations. The analysis of covariance (ANACOVA) for time series data was used to determine whether the observed differences in concentrations were statistically significant for stations within a geographic grouping. Stations not exhibiting statistically significant differences for the key parameters of concern are then considered redundant, and hence available for elimination. While the Coastal Water Monitoring Program is not driven by permit requirements, certainly the same approach can be used to determine redundancy in permit-required monitoring.

- **Frequency of Sample Collection**
  There exists an opportunity for adjusting the frequency of sample collection without sacrificing data regarding compliance status. The evaluation of necessity for frequency of sampling should be based upon two factors. The first is the needed level of statistical confidence in the data for the specific compliance issue. The second is based upon the intent or goal of the permit-required monitoring in the first place. If the goal is to ascertain the relative "health" of the water body, then a sampling frequency that reflects ecosystem knowledge of the normal variations in the key parameters over time is required. For example, since it is known that dissolved oxygen varies tremendously within 24-hour periods then no reasonable or affordable sample collection program will accurately pick up the natural fluctuations.

- **Number of Parameters Sampled/Tested**
  In the evaluation performed for the June 3, 2003 permit modification request on the Non-ECP permit, it was recommended that sampling and testing for trace metals was no longer a relevant or appropriate permit-required monitoring requirement. For example in the analysis of cadmium over the past three years it was shown that there were no excursions above the Class III standard. This same type of analysis can be applied to a wide range of parameters in each of the permit-required monitoring networks.

Construction and Implementation of GIS Tool

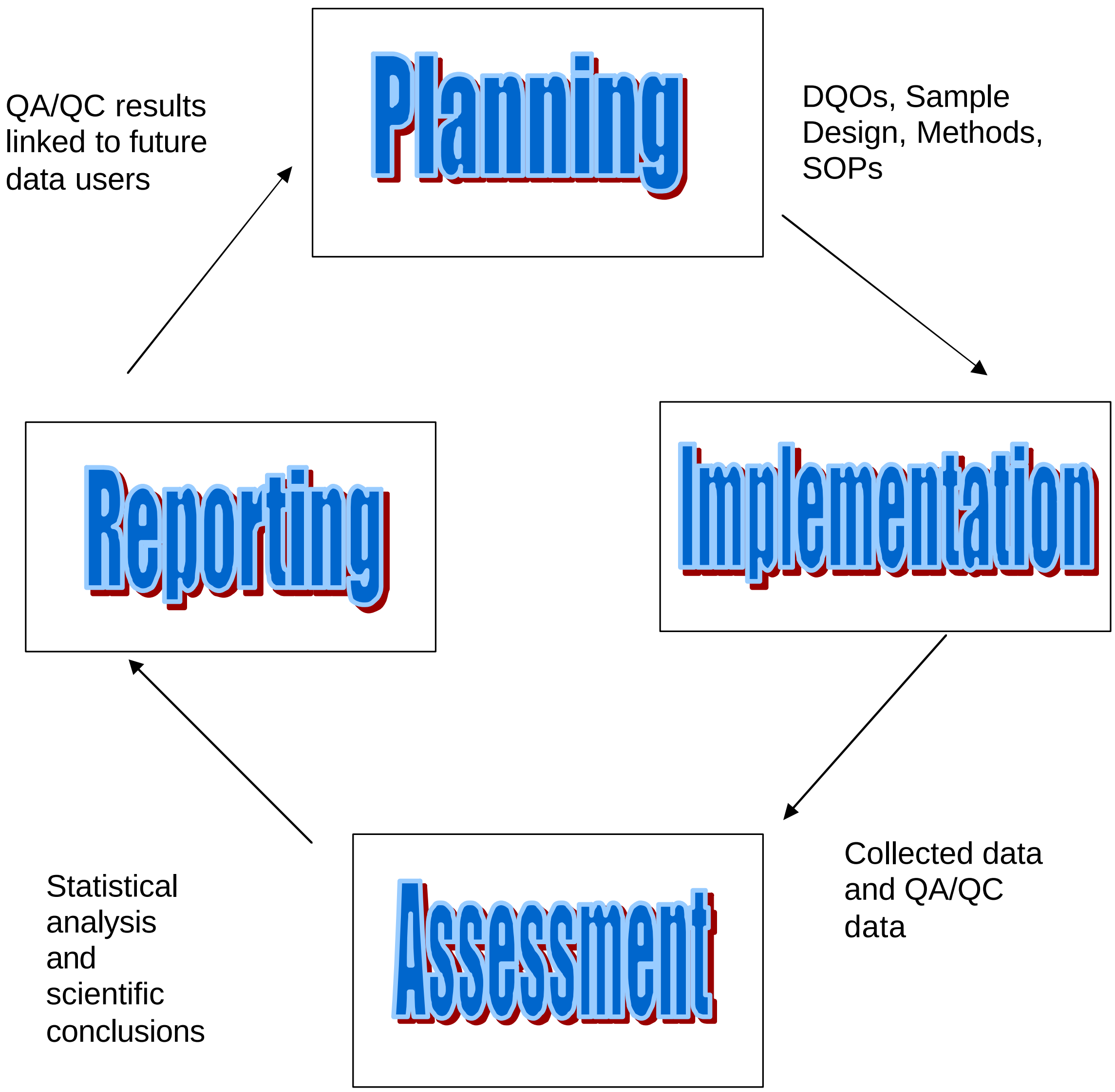
The execution of this task included the development of GIS products for both the existing permits and the potential future CERP permitting processes. This Task will help to identify existing permit-required monitoring sites and data that could be used to negotiate future permit-related monitoring requirements for CERP projects. An additional goal of this tool is the identification of sites that are either duplicative of other sites or provide no additional meaningful data for the permit.

Management of CERP Permits

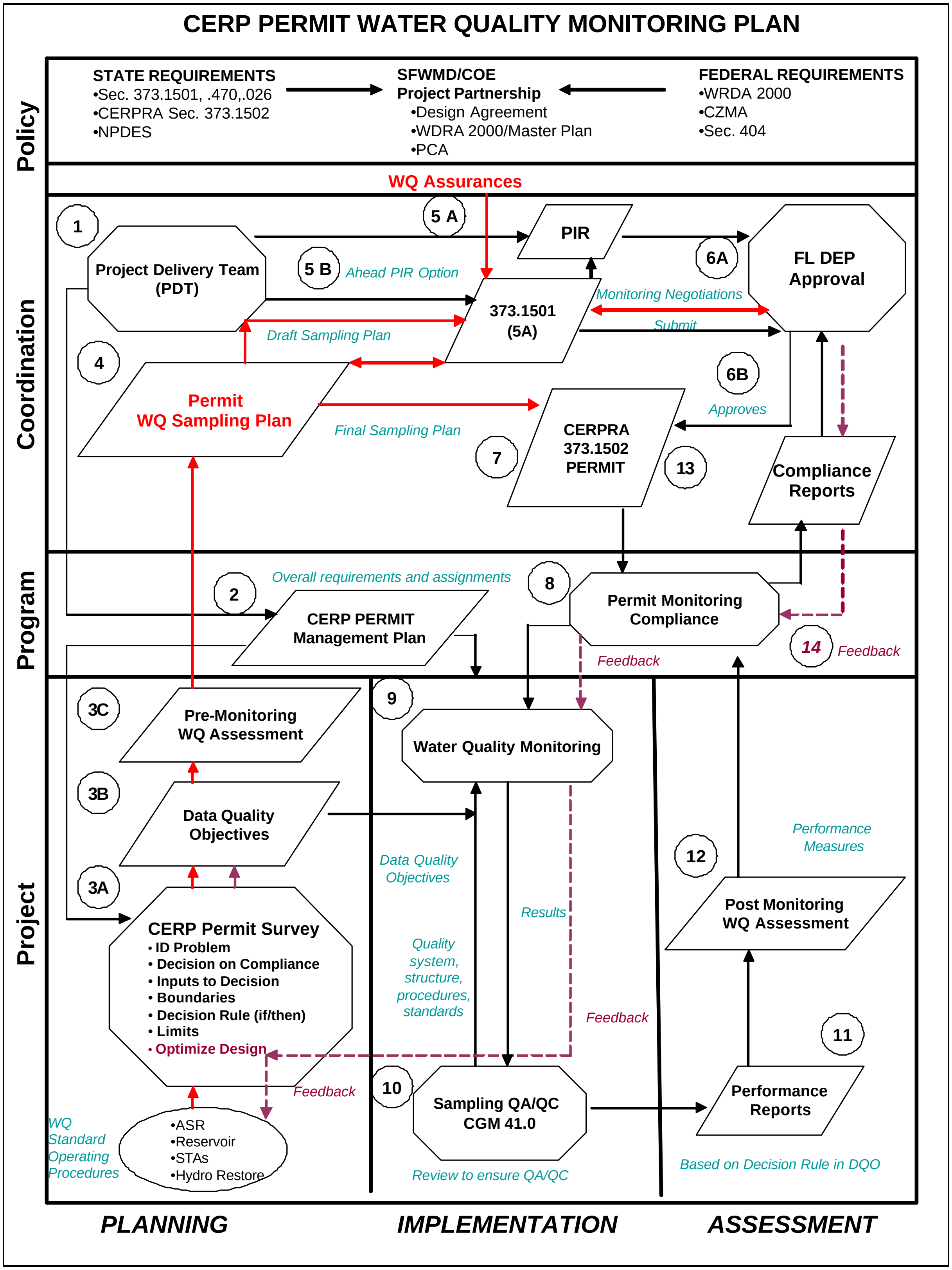
The CERP initiatives could dramatically increase the workload for mandated monitoring at the District. With this in mind, the POP Team looked at opportunities to organizationally streamline the permitting process for CERP projects.

The CERP WQMPP was designed to be used by project and program managers for the production of environmental data of known quality and to fulfill the water quality monitoring objectives of the permit. The CERP Water Quality Monitoring Plan Process (CERP WQMPP) was written to ensure all necessary water quality components, coordination and products under a CERP permit will be planned, implemented and assessed to achieve the State's water quality objectives within the Section 373.1501 application and within 373.1502 of the Comprehensive Everglades Restoration Plan Act (CERPRA).

The overlying structure of the CERP WQMPP highlights the policy mandates, includes the coordination required in processing a CERPRA permit, outlines the District's program responsibilities for CERP permits and finally details the District's monitoring component of the project. Within the project, the data cycle consists of planning, implementation, assessment and reporting. See the following figure for CERP WQMPP



DATA LIFE CYCLE


CERP PERMIT WATER QUALITY MONITORING PLAN
Policy
STATE REQUIREMENTS
•Sec. 373.1501, .470,.026
•CERPRA Sec. 373.1502
•NPDES
SFWMD/COE
Project Partnership
•Design Agreement
•WDRA 2000/Master Plan
•PCA
FEDERAL REQUIREMENTS
•WRDA 2000
•CZMA
•Sec. 404
WQ Assurances
Coordination
1
Project Delivery Team (PDT)
5 A
PIR
6A
FL DEP Approval
5 B
Ahead PIR Option
373.1501 (5A)
Monitoring Negotiations
Submit
Draft Sampling Plan
4
Permit WQ Sampling Plan
6B
Approves
Final Sampling Plan
7
CERPRA 373.1502 PERMIT
13
Compliance Reports
Program
2
Overall requirements and assignments
CERP PERMIT Management Plan
8
Permit Monitoring Compliance
14
Feedback
Feedback
Project
3C
Pre-Monitoring WQ Assessment
9
Water Quality Monitoring
3B
Data Quality Objectives
Data Quality Objectives
Performance Measures
12
Results
3A
CERP Permit Survey
• ID Problem
• Decision on Compliance
• Inputs to Decision
• Boundaries
• Decision Rule (if/then)
• Limits
• Optimize Design
Quality system, structure, procedures, standards
Post Monitoring WQ Assessment
Feedback
11
Feedback
10
Sampling QA/QC CGM 41.0
Performance Reports
WQ Standard Operating Procedures
•ASR
•Reservoir
•STAs
•Hydro Restore
Review to ensure QA/QC
Based on Decision Rule in DQO
PLANNING
IMPLEMENTATION
ASSESSMENT

Key Results Accomplished

This Permit Optimization Project accomplished all of the goals set out for it in June 2003. The POP Team identified over $611,000 in annual cost savings through reduced parameter optimization for these 6 projects. In addition, another $294,000 in savings were identified as potential reductions due to sample frequency optimization.

Impact of Parametric & Frequency Reductions on Permit Monitoring Costs						
	Monitoring Program Costs			Potential Savings		
Project	FY04 Annual Costs	Reduced Parameter Annual Costs	Reduced Frequency Annual Costs	Annual Parameter Savings	Annual Frequency Savings	TOTAL Percent Savings
STA 1W	$ 489,190	$ 409,066	$ 343,997	$ 80,124	$ 65,069	29.7%
STA 2	$ 843,574	$ 731,845	$ 643,840	$ 111,729	$ 88,005	23.7%
STA 5	$ 620,614	$ 503,731	$ 400,710	$ 116,883	$ 103,021	35.4%
STA 6	$ 199,545	$ 146,531	$ 132,405	$ 53,014	$ 14,126	33.6%
Non-ECP	$ 695,036	$ 447,978	$ 447,978	$ 247,059	$ -	35.5%
Holeyland	$ 25,989	$ 23,736	$ -	$ 2,253	$ 23,736	100.0%
Total	$ 2,873,948	$ 2,262,886	$ 1,968,930	$ 611,062	$ 293,956	31.5%
Total Savings (parametric & frequency) = $ 905,019						

And finally, approximately $100,000 in annual cost savings were identified in the Mercury and Pesticide Monitoring programs. Overall, this project identified approximately $1 million, over 30%, in annual cost savings for existing permit-required monitoring programs of the District.

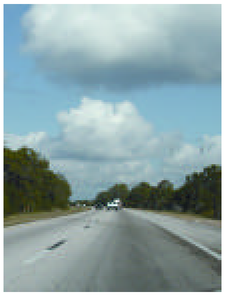
In addition, a process for efficient permit management of CERP permitting was identified and developed and a web-based GIS tool was developed and implemented to aid in the administration of the permit monitoring programs.

Recommendations

It is recommended that the District submit requests for permit modifications for the permits issued by DEP for the six permitted projects identified in detail in this report. The modifications requested would be two-fold: first, reduction in the identified parameters and sites; and the second modification, which would occur in a year after completion of the demonstration project, of the weekly sampling requirements to bi-weekly.

It is recommended that the District allocate the necessary resources to maintain the web-based tool for permit monitoring networks. It is recommended that the CERP permit acquisition staff be trained on how to utilize the tool for upcoming CERPRA permit applications.

It is recommended that the CERP WMQPP be implemented as a process for ensuring all necessary water quality components, coordination and products for a CERP permit will be planned, implemented and assessed. It is also recommended that the District, USACE and FDEP meet to discuss and evaluate this process for permitting CERP projects.



Section 1
INTRODUCTION

The South Florida Water Management District (District) is rarely exempt from obtaining permits for the construction and operation of its works and projects. The District must adhere to the terms and conditions of those permits or be subject to enforcement action and penalties. In addition, federal and state environmental laws have placed an increased emphasis on water quality, which in turn have increased the District's monitoring responsibilities.

The District complies with a multitude of permit-required monitoring and assessment work for biological, hydraulic, hydrologic, hydrogeologic, and water quality parameters. With the ongoing modifications to the Everglades Construction Project, the creation of the Comprehensive Everglades Restoration Plan (CERP) projects with their individual monitoring plans, and the construction of other capital and Federal–State projects, the amount of permit-required monitoring is increasing measurably.

It is also expected that some or all of the CERP components' baseline monitoring stations will be incorporated into permit conditions required for the design, construction, and/or operation of those projects. In addition, the District and the U.S. Army Corps of Engineers (USACE), with the assistance of many other agencies, have developed the Monitoring and Assessment Plan (MAP), a key component of the RECOVER Program. The MAP calls for: 1) monitoring to measure system-wide responses; 2) assessing how well CERP is meeting its goals and objectives; 3) identifying opportunities for improving the performance of CERP components where needed.

Clearly, mandated monitoring could increase dramatically at the District. The purpose of this Permits Optimization Project is to:

- Look for opportunities to organizationally streamline the process used by the District to obtain permits.
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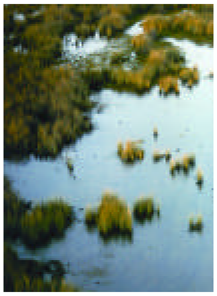


Section 2
PERMITS ISSUED TO THE DISTRICT– BACKGROUND INFORMATION

The majority of permits that the District must obtain are processed and issued by the Florida Department of Environmental Protection (FDEP). Key existing permits were issued in accordance with the Everglades Forever Act (EFA). Subsequently, the FDEP issued long-term operation permits under the federal National Pollutant Discharge Elimination System (NPDES), delegated to FDEP from the U.S. Environmental Protection Agency (EPA).

Water Quality Monitoring under the EFA

The permits issued to the District under the EFA requirements contain several relevant standard conditions that deal with water quality monitoring programs. The FDEP uses the following standard condition to determine whether or not the permitted facility is in compliance:

> *"Comparison of Outflows to Inflows. For all water quality parameters indicated in the Monitoring Table other than total phosphorus and dissolved oxygen, inflow and outflow samples collected at the sampling locations identified shall be used to determine compliance with this specific condition. Compliance with this specific condition shall be evaluated as follows:*
>
> *A. If the annual average outflow concentration does not cause or contribute to violations of applicable Class III water quality standards, then the facility shall be deemed in compliance with this condition.*
>
> *B. If the annual average concentration at the outflow station causes or contributes to violations of applicable Class III water quality standards, but is of equal or better quality than, the annual average concentration at the inflow stations, then the facility shall be deemed in compliance with this condition.*
>
> *C. If the annual average concentration at the outflow causes or contributes to violations of applicable Class III water quality standards, and also exceeds the annual average concentration at the inflow station, then the facility shall be deemed out of compliance with this condition."*

This condition was intended to address the relationship between the state water quality standards and the intended operational performance of the Stormwater Treatment Areas (STAs). In addition, since there had not been any significant previous experience in Florida with STAs, the following condition was also included in order to provide a mechanism to reduce the monitoring frequency or number of parameters collected at a station after sufficient data had been collected to justify a finding of no significant impact:

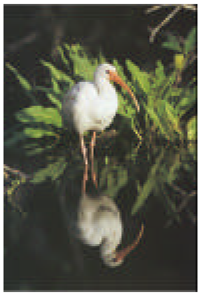
> *"Removal of Parameters. Upon demonstration that a specific parameter(s) is not present or is found consistently in compliance with Class III Water Quality Standards, the permittee may request a modification to the monitoring program as appropriate. A minimum of one year's worth of data, for those parameters being sampled quarterly or more frequently, will be required prior to the Department approving any modification to the monitoring program. Parameters sampled semi-annually or annually will be examined on a case-by-case basis. The Department may approve a reduction of the monitoring frequency or waive the monitoring requirement for parameters that consistently are reported as in compliance with state water quality standards."*

Water Quality Monitoring under NPDES

The permits issued to the District under the NPDES requirements also contain a standard condition that provides a mechanism to reduce the monitoring frequency or number of parameters. The FDEP uses the following condition to determine whether or not the permitted monitoring can be reduced:

> *"Upon demonstration that a specific parameter(s) is consistently shown to be undetected in the effluent, the permittee may request a modification to the monitoring program as appropriate. A minimum of two years of data, for those parameters being sampled quarterly or more frequently, will be required prior to the Department approving any modification to the monitoring program. The Department may approve a reduction of the monitoring frequency or waive the monitoring requirement for parameters which consistently shown to be undetected in the effluent."*

These permit conditions provide the mechanism and basis for the detailed evaluations and analyses performed by the Permit Optimization Project Team.



Section 3
METHODOLOGY AND RESULTS

A. Permit Optimization Project Team

Data collection, analysis and reporting for this project was made possible through the combined efforts of key internal District staff supported by contractual resources. The Permit Optimization Project Team (POP Team) consisted of:

Jennifer Jorge, PhD – Project Director, ERD
Nenad Iricanin, PhD – Senior Environmental Scientist, EMA
Guy Germain – Staff Environmental Scientist, EMA
Richard Pfeuffer – Senior Environmental Scientist, EMA
Thomas Raishe – Staff Systems Analyst, EMA
Trudy Morris – Staff Web Technical Support Analyst, EMA
Timothy Bechtel, PhD – Senior Supervising Environmental Scientist, EMA
Dick March, PhD – Staff Economist, WSD
Paul McGinnes, PhD, PE – Lead Engineer, ERR
Barbara Powell – Senior Environmental Scientist, ERR

Contractor Support Personnel:
Raj Kamthe
Millie Radzikhovsky
Alan Hall, PE

Note: ERD = Everglades Restoration Department, EMA = Environmental Monitoring & Assessment Department, WSP = Water Supply Department, ERR = Everglades Resource Regulation Department.

These team members received significant organizational support from their managers and co-workers which allowed them to accomplish the voluminous tasks involved in this effort.

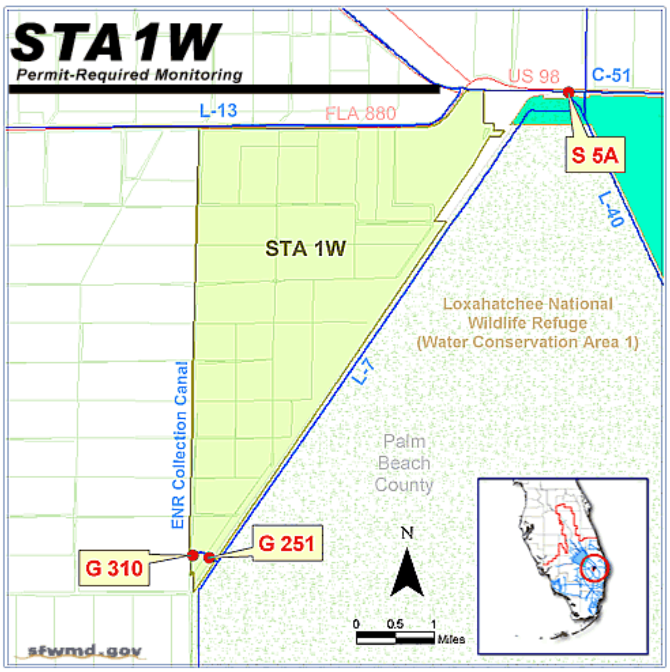
B. Selection of Parameters for Reduction Consideration, showing details of ECP STA 1 West analysis

The POP Team met on a weekly basis as needed to review data findings and strategies. The Team's initial targets were the permit-required monitoring programs for the Everglades Construction Project (ECP/STAs) and the Non-Everglades Construction Project (Non-ECP). A matrix was developed for each major permit that showed the monitoring sites and list of parameters required. The POP Team reviewed the matrix and discussed the preliminary

ecological factors associated with the selection of the parameters for monitoring. For example, the team discussed why we might anticipate seeing no significant variances between inflows and outflows for key parameters associated with a Stormwater Treatment Area. A draft matrix of Potential Reduction Opportunities was then established, which became the targeted parameters for data collection, analysis, and review.

In order to be complete, but not repetitive, we will only use the data and analyses for Stormwater Treatment Area 1W as example illustrations. All of the data and analyses for the other permitted projects discussed in this report are included in the Appendices. STA 1W is located in western Palm Beach County on the west side of Water Conservation Area 1. Monitoring for permit compliance is performed at three sites shown in Figure 1.

Figure 1: STA 1W Permit Monitoring Sites



Stormwater Treatment Area 1W (DEP Permit FL0177962-001)

The following graphic, Figure 2, is the Reduction Opportunities Matrix that was developed by the team for the STA 1 West project:

Figure 2: STA 1W Permit Optimization Matrix

					Total Nitrogen														
	Parameter	Dissolved Oxygen	pH	Specific Conductivity	Temperature	Nitrate + Nitrite	Total Kjeldahl Nitrogen	*Alkalinity*	*Dissolved Chloride*	*Orthophosphate as P*	*Sulfate*	*Total Dissolved Solids*	*Turbidity*	Ametryn	Atrazine	Total Phosphorous	*Total Dissolved Phosphorus*	*Ammonia*	*Total Dissolved Nitrogen*
Station																			
STA 1W																			
ENR012		X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	O	O	O
G310		X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	O	O	O
S5A		X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	O	O	O
O = Reduction Opportunity																			

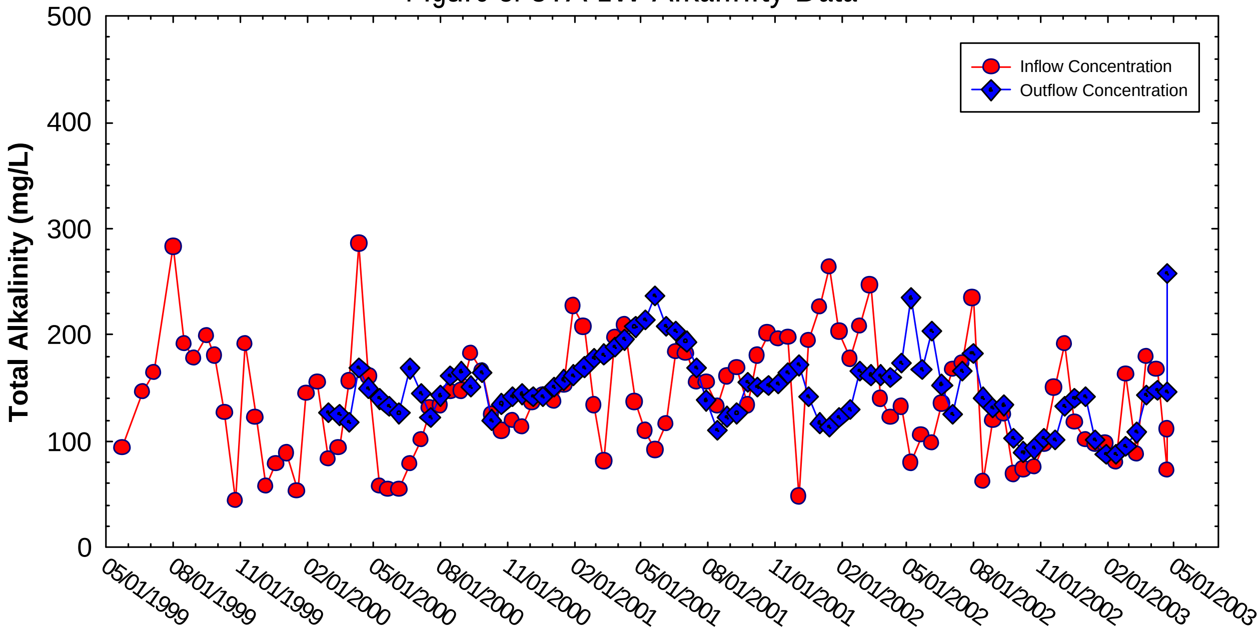
This matrix identified 9 key parameters (shown as "o") out of a total of 18, which the POP Team felt could be targets for reduction or removal based upon a detailed analysis of the period of record data.

Relevant water quality data were retrieved from the District's DBHYDRO corporate database, and statistical and/or comparative analyses were performed. Plots comparing inflow and outflow concentrations for each parameter were generated and presented herein.

Alkalinity

Figure 3 shows the plot of alkalinity concentrations at the inflow and outflow sites at STA 1W for the period from May 1999 through May 2003.

Figure 3: STA 1W Alkalinity Data

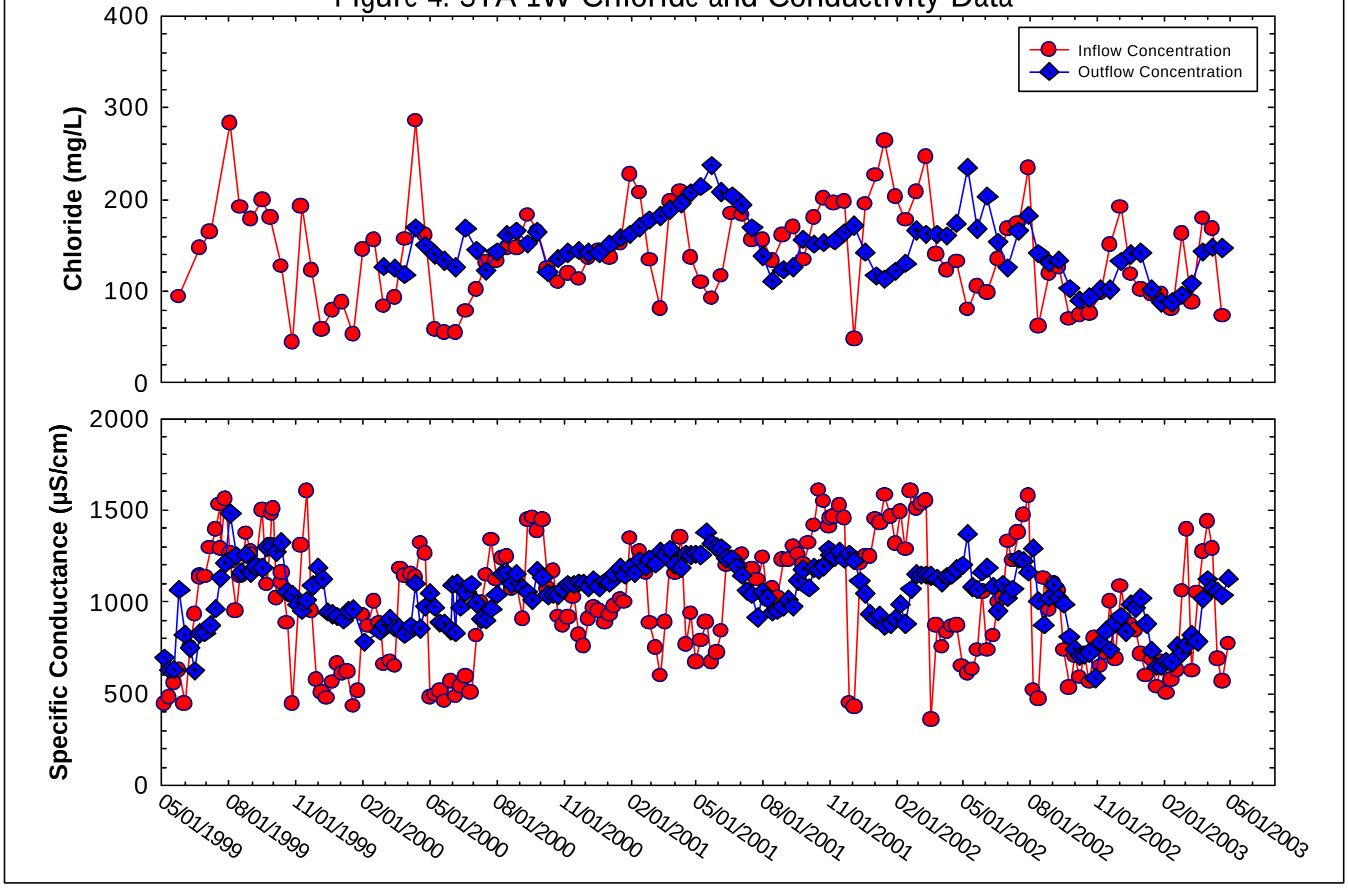


Alkalinity concentrations measured during this three-year period were never below the 20 mg/L limit specified under Subsection 62-302.530 of the Florida Administrative Code (FAC) for Class III waters. In addition, a Wilcoxon signed ranks test indicated that the inflow and outflow concentrations were not significantly different ($p>0.05$). Therefore, based on the conditions outlined by the FDEP, this parameter is a candidate for removal from the monitoring requirements of the STA 1W permit.

Chloride and Specific Conductivity

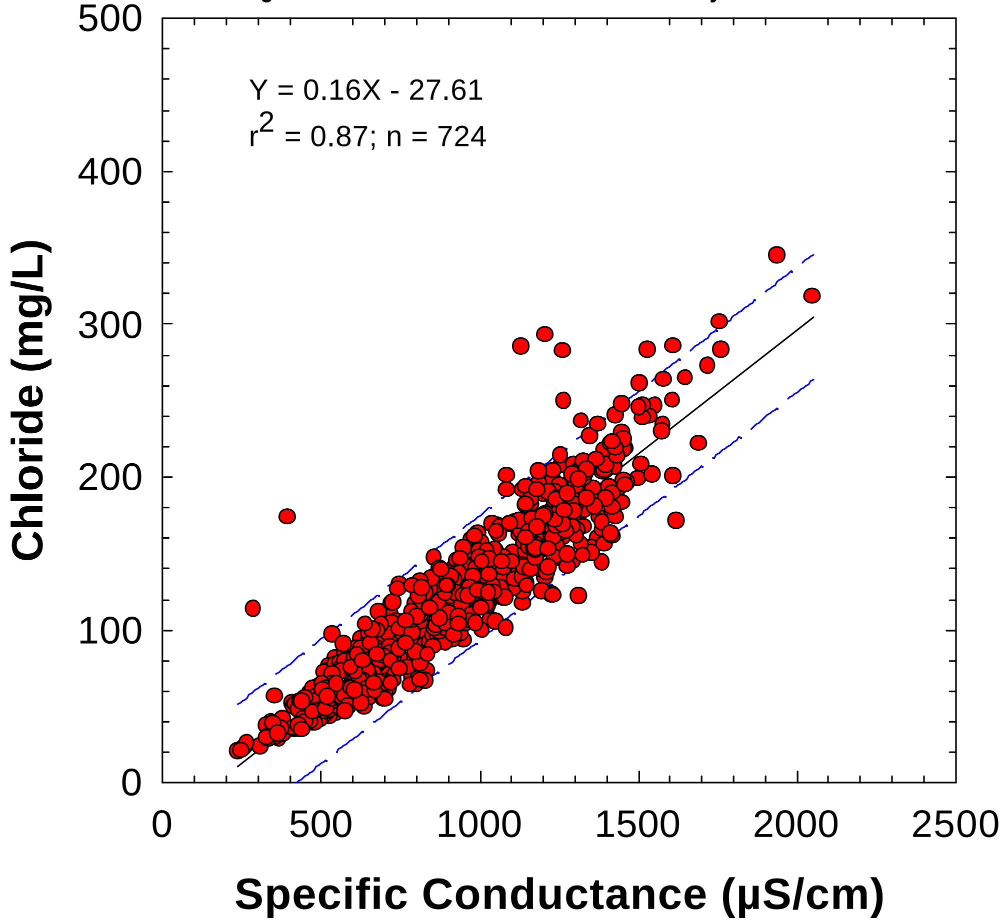
Concentrations of chloride and the specific conductance at the inflow and outflow monitoring sites in STA 1W were compared for the same three-year period as alkalinity (Figure 4). Both parameters were plotted together, because chloride is a constituent that directly affects the measure of conductivity. In other words, as chloride concentrations increase, conductivity levels will increase as well. No numeric criteria exist for chloride in Class III freshwater. However, Section 62-302.503, FAC, does state: "chlorides shall not be increased more than 10% above normal background. Normal daily and seasonal fluctuations shall be maintained." Under Section 62-302, FAC, specific conductivity "shall not be increased more than 50% above background or to 1275 (? S/cm), whichever is greater."

Figure 4: STA 1W Chloride and Conductivity Data



In this case, neither of the two parameters exhibited a statistically significant difference ($p>0.05$) between inflow and outflow concentrations. Additionally, a strong relationship was found between chloride and specific conductivity (see Figure 5, with an r-value of 0.87) suggesting that specific conductivity can be used as a surrogate in estimating changes in chloride concentrations. Therefore, it is strongly recommended that chloride be removed from the list of parameters for STA 1W permit compliance.

Figure 5: STA Chloride-Conductivity Correlation



Total Dissolved Solids and Conductivity

Figure 6 compares the concentration of total dissolved solids (which are mostly salts) with specific conductivity at the inflow and outflow of STA 1W. No statistically significant difference ($p>0.05$) was observed for either parameter between inflow and outflow concentrations. Specific conductivity of water is a measure of the ability of the water to conduct electricity. Conductivity is determined by measuring the concentration of dissolved salts. The more salts dissolved in the water, the better the water conducts electricity.

Figure 6: STA 1W TDS and Conductivity Data

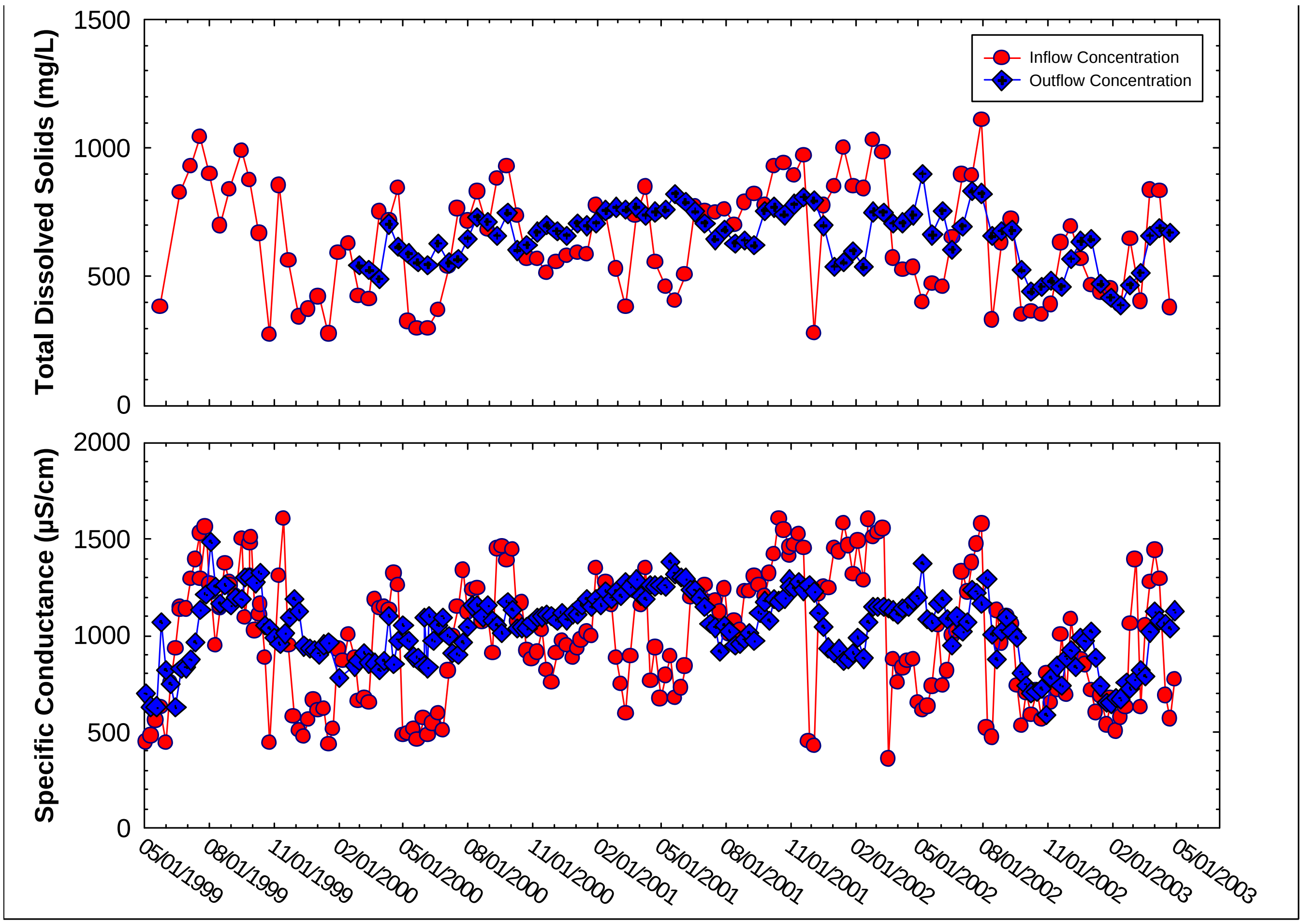
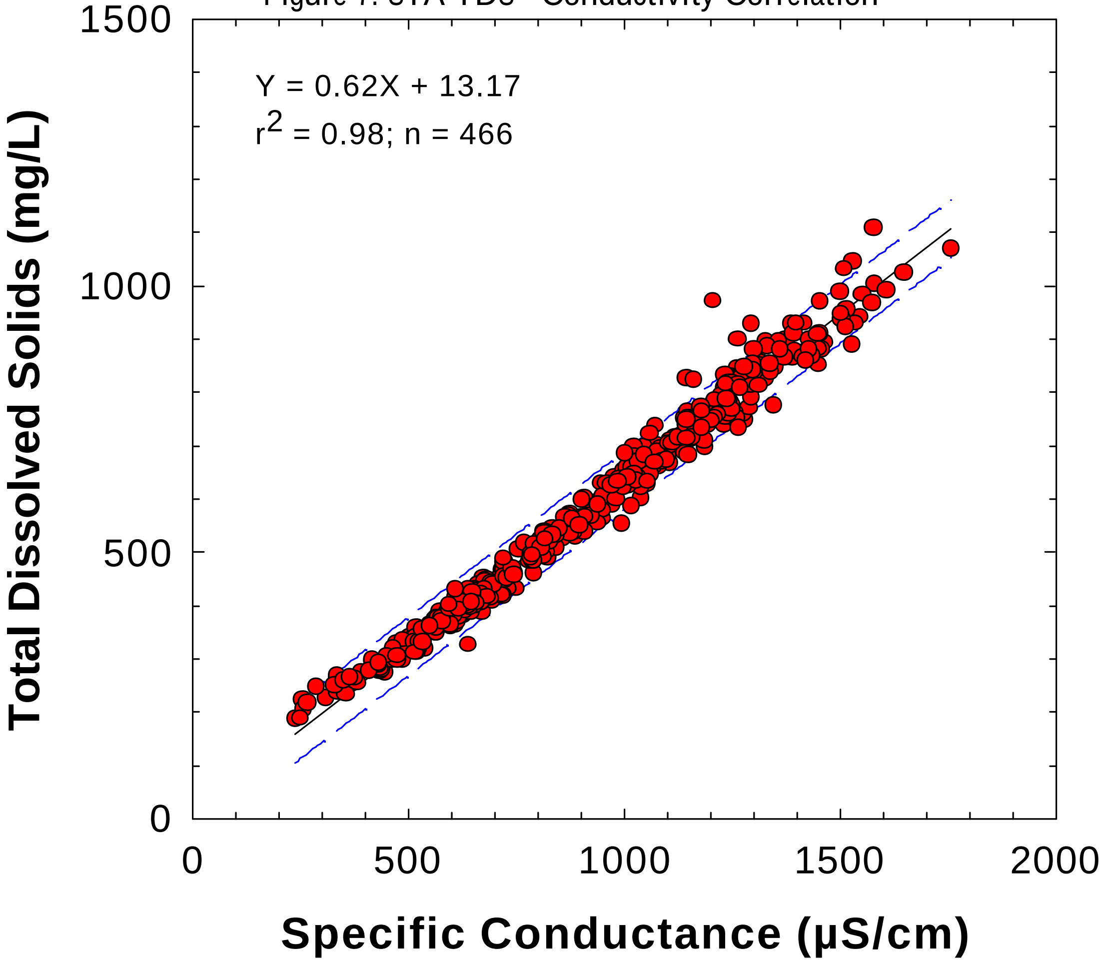


Figure 7 depicts the strong relationship between specific conductivity and total dissolved solids for data collected at the STAs. Therefore, specific conductivity is an excellent "surrogate" parameter for total dissolved solids as well. No criterion for total dissolved solids in Class III freshwater bodies. Therefore, it is strongly recommended that total dissolved solids be removed from the STA 1W permit monitoring requirements.

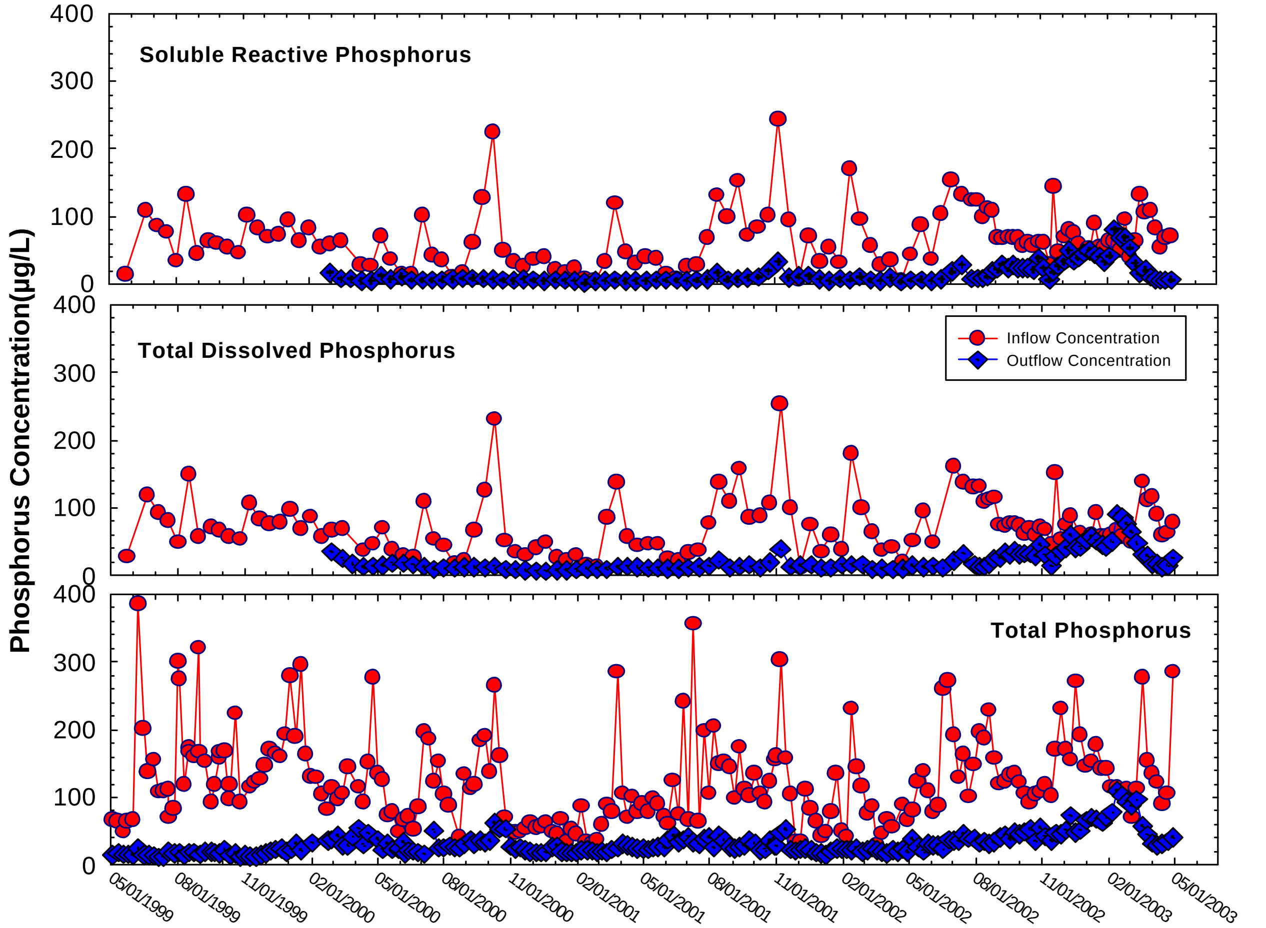
Figure 7: STA TDS - Conductivity Correlation



Phosphorus

A comparison of soluble reactive phosphorus, total dissolved phosphorus, and total phosphorus is provided in Figure 8. Overall, the same trends are observed for the three phosphorus types. All three types of phosphorus exhibit significantly lower concentrations ($p<0.05$) in the outflow from STA 1W than at the inflow. In addition, both the soluble reactive phosphorus and total dissolved phosphorus are contained within the total phosphorus value. As total phosphorus concentrations change so will these two fractions of phosphorus. Therefore, it is suggested that both total dissolved phosphorus and soluble reactive phosphorus be removed as separate parameters from the permit compliance monitoring for STA 1W.

Figure 8: STA 1W Phosphorous Data Sets



Nitrogen

The situation for total dissolved nitrogen and total nitrogen concentrations in STA 1W (see Figure 9) is similar to that of phosphorus. Both types of nitrogen have exhibited significantly lower concentrations ($p<0.05$) in the outflow as compared with the inflow. In addition, a strong relationship ($r=0.86$) was observed between total dissolved nitrogen concentrations and total nitrogen concentrations for the STAs (see Figure 10). Based on this information it is recommended that total dissolved nitrogen be removed as a required permit compliance parameter for STA 1W. The removal of total dissolved nitrogen would not result in the loss of any relevant or significant data.

Figure 9: STA 1W Nitrogen Data Sets

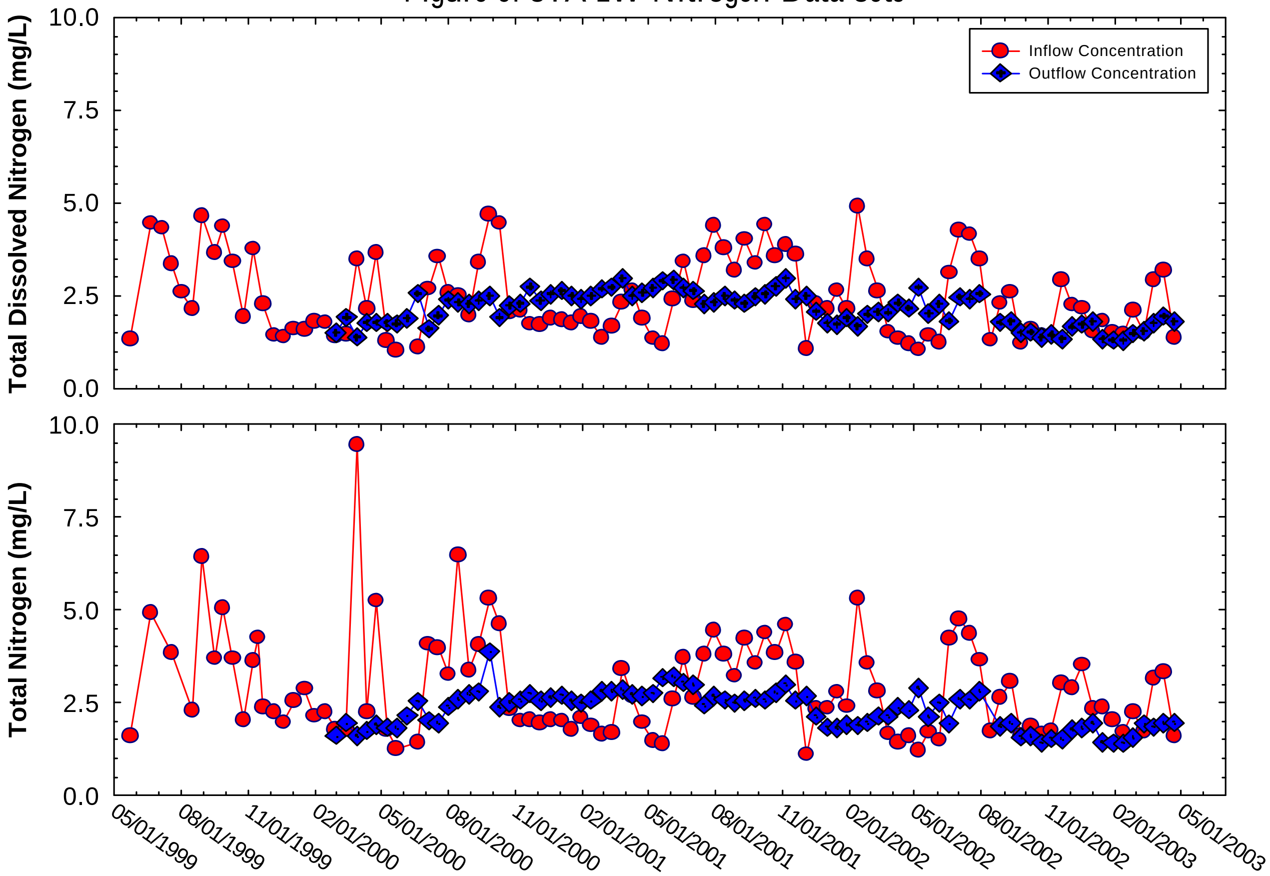
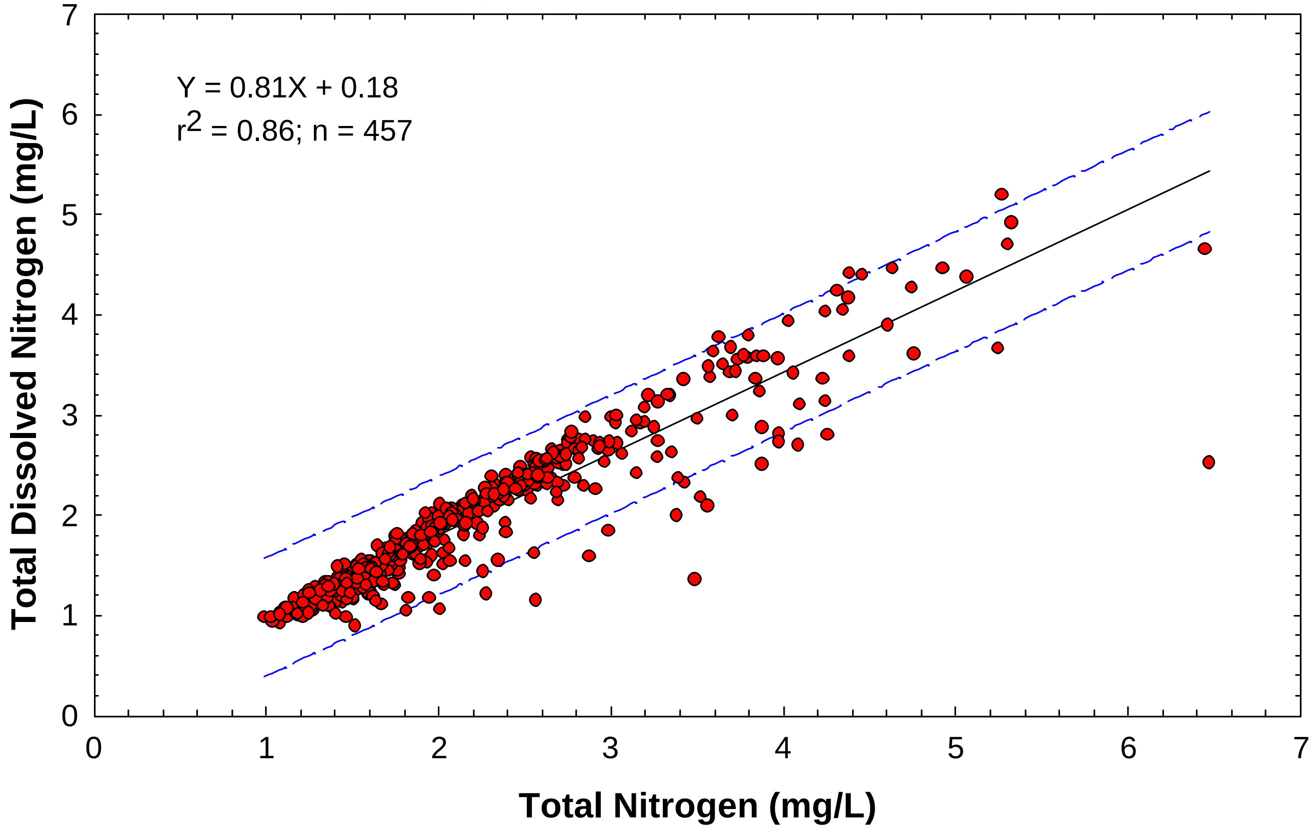


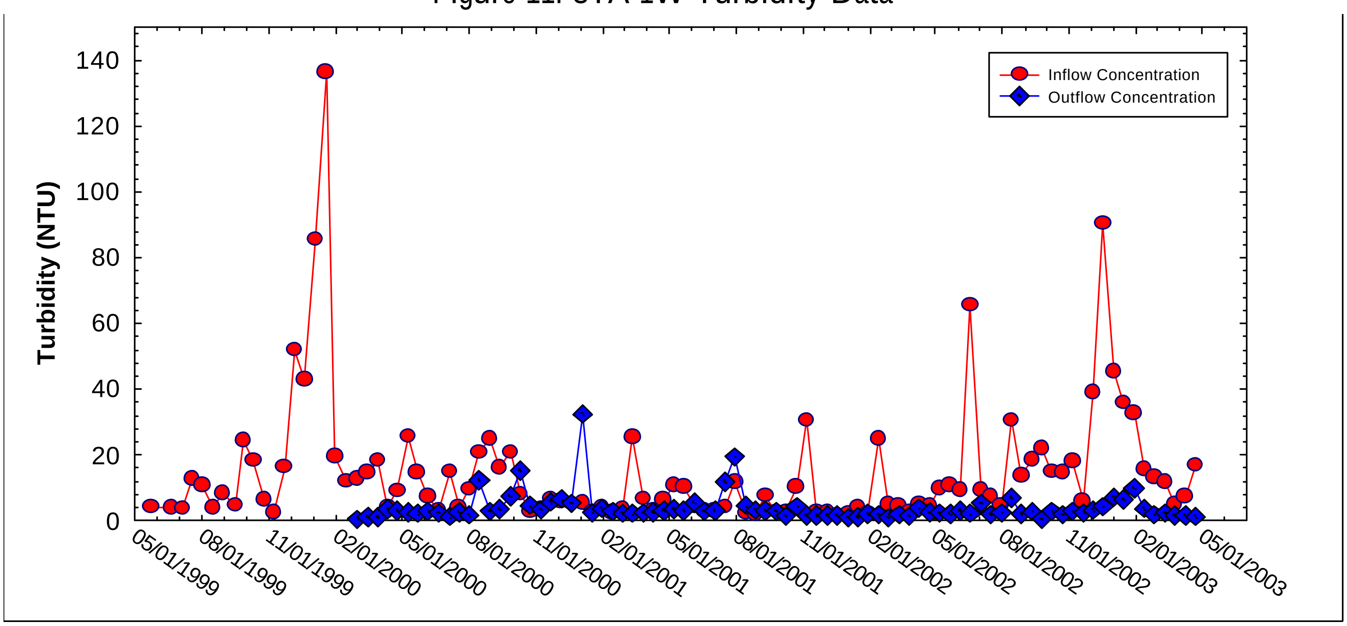
Figure 10: STA Nitrogen Correlations



Turbidity

Turbidity levels measured at the STA 1W inflow and outflow from May 1999 through May 2003 are presented in Figure 11. During this period, inflow turbidity levels were consistently and significantly higher ($p<0.05$) than outflow levels. Only 1 out of 83 events (~1%) exhibited a turbidity level greater than the 29 NTU limit specified under Subsection 62-302.530, FAC.

Figure 11: STA 1W Turbidity Data

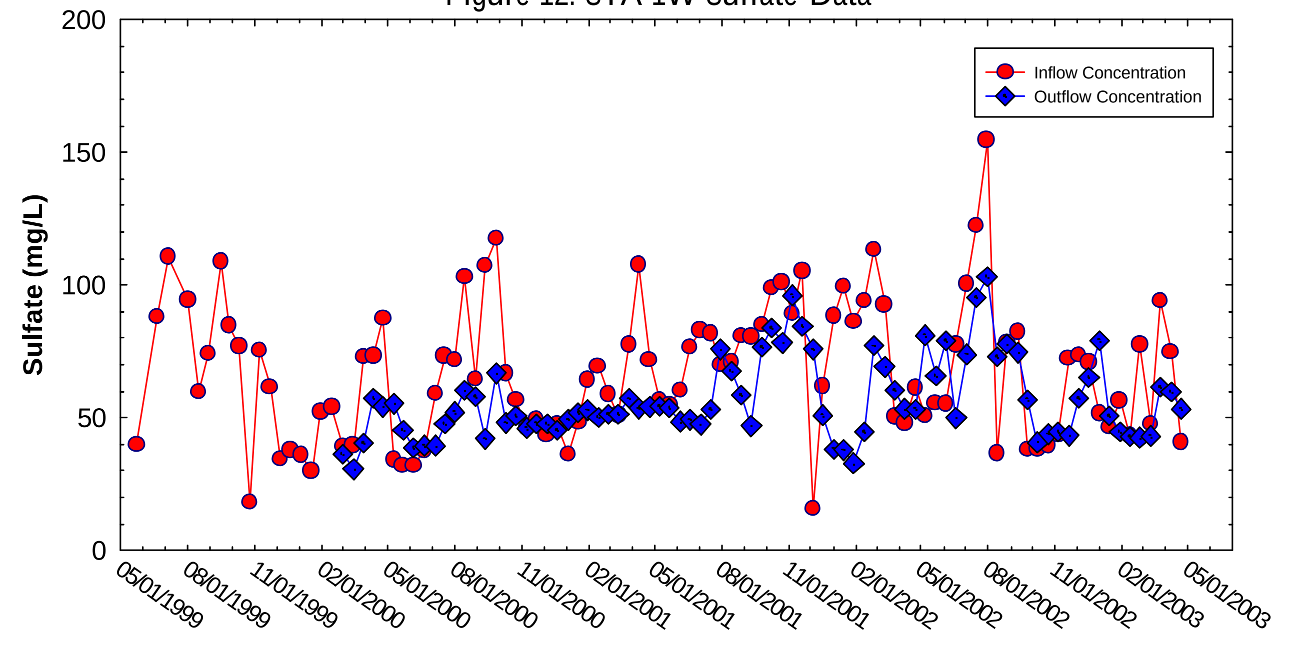


Variations in turbidity would typically be associated with early project phases when the surface soils are first disturbed by construction or by high surface flows that the area would not have previously experienced. Now that STA 1W has stabilized, there would be no reason to expect turbidity to increase.

Sulfate

The plot of sulfate concentrations at the inflow and outflow of STA 1W for a three-year period is provided in Figure 12. A significant statistical difference ($p<0.05$) was observed between the inflow and outflow sulfate concentrations, with the inflow concentrations being significantly higher. There is no surface water criterion for sulfate in freshwater. Since no criterion exists for sulfate and the outflow concentrations are consistently lower than the inflow concentrations, it is recommended that sulfate be removed from the permit compliance monitoring.

Figure 12: STA 1W Sulfate Data



C. Other ECP Locations

A. Stormwater Treatment Area 2 (DEP Permit FL0177946-001)

Figure 13 is the Reduction Opportunities Matrix that was developed for the STA 2 project:

Figure 13: STA 2 Permit Optimization Matrix

					Total Nitrogen												
	Parameter	Dissolved Oxygen	pH	Specific Conductivity	Temperature	Nitrate + Nitrite	Total Kjeldahl Nitrogen	*Alkalinity*	*Dissolved Chloride*	*Orthophosphate as P*	*Sulfate*	*Total Dissolved Solids*	*Turbidity*	Total Phosphorous	*Total Dissolved Phosphorus*	*Ammonia*	
Station																	
STA 2																	
G328		X	X	X	X	X	X	O	O	O	O	O	O	X	O	O	
G335		X	X	X	X	X	X	O	O	O	O	O	O	X	O	O	
S-6		X	X	X	X	X	X	O	O	O	O	O	O	X	O	O	
O = Reduction Opportunity																	

This matrix identified 8 key parameters (shown as "o"), out of a total of 15, that the POP Team felt could be targets for reduction or removal based upon a detailed analysis of the period of record data.

Water quality data were retrieved from the District's DBHYDRO database, and statistical and/or comparative analyses were performed. Instead of reproducing within the body of this report the parametric plots for the other STAs, as was previously shown for STA 1W, the plots comparing inflow and outflow concentrations for each parameter were generated for all other permitted STAs and are provided in the Appendix.

B. Stormwater Treatment Area 5 (DEP Permit FL0177954)

Figure 14 is the Reduction Opportunities Matrix that was developed for the STA 5 project:

Figure 14: STA 5 Permit Optimization Matrix

					Total Nitrogen														
	Parameter	Dissolved Oxygen	pH	Specific Conductivity	Temperature	Nitrate + Nitrite	Total Kjeldahl Nitrogen	*Alkalinity*	*Dissolved Chloride*	*Orthophosphate as P*	*Sulfate*	*Total Dissolved Solids*	*Turbidity*	Ametryn	Atrazine	Total Phosphorous	*Total Dissolved Phosphorus*	*Ammonia*	*Total Dissolved Nitrogen*
Station																			
STA 5																			
G342A		X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	O	O	O
G342B		X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	O	O	O
G342C		X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	O	O	O
G342D		X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	O	O	O
G344A		X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	O	O	O
G344B		X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	O	O	O
G344C		X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	O	O	O
G344D		X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	O	O	O
O = Reduction Opportunity																			

This matrix identified 9 parameters (shown as “o”), out of a total of 18, that the POP Team felt could be targets for reduction or removal dependent upon a detailed analysis of the period of record data sets. Plots comparing inflow and outflow concentrations for each parameter were generated and are provided in the Appendix.

C. Stormwater Treatment Area 6 (DEP Permit 262918309)

The permit for STA 6 is unique in that, chronologically, it was actually the first stormwater treatment area to receive an FDEP permit. As a result, this permit identified much more monitoring than did subsequent permits. As both the District and the FDEP gained operational knowledge of the systems, that it was determined for later permits that certain parameters were not useful.

Figure 15 is the matrix of reduction opportunities that was developed by staff for the STA 6 project:

Figure 15: STA 6 Permit Optimization Matrix

						Total Nitrogen																		
	Parameter	Dissolved Oxygen	pH	Specific Conductivity	Temperature	Nitrate + Nitrite	Total Kjeldahl Nitrogen	*Alkalinity*	*Dissolved Chloride*	*Orthophosphate as P*	*Sulfate*	*Turbidity*	Ametryn	Atrazine	Total Phosphorous	*Ammonia*	*Color*	*Total Suspended Solids*	*Dissolved Calcium*	*Dissolved Magnesium*	*Dissolved Potassium*	*Dissolved Sodium*	*Silica*	*Total Iron*
Station																								
STA 6																								
G354C		X	X	X	X	X	X	O	O	O	O	O	X	X	X	O	O	O	O	O	O	O	O	O
G393B		X	X	X	X	X	X	O	O	O	O	O	X	X	X	O	O	O	O	O	O	O	O	O
G600		X	X	X	X	X	X	O	O	O	O	O	X	X	X	O	O	O	O	O	O	O	O	O
O = Reduction Opportunity																								

This matrix identified 14 parameters (shown as "o"), out of a total of 23, that the staff felt could be targets for reduction or removal. Many of these parameters had already been removed, with DEP concurrence, from other permits. Plots comparing inflow and outflow concentrations for each parameter were generated and are provided in the Appendix.

D. STA Data Summary and Justifications

An analysis of the period of record data for the Stormwater Treatment Areas is provided in Tables 1 through 4. This analysis compares the annual means of the inflows and outflows for determination of compliance as required by the permit monitoring. These tables show the data for the STAs for the following parameters:

- Alkalinity
- Chloride
- Soluble Reactive Phosphorus
- Specific Conductivity
- Total Dissolved Nitrogen
- Total Dissolved Solids
- Total Nitrogen
- Total Phosphorus
- Turbidity

Table 1: Class III Compliance Test STA 1 West

Parameters	Monitoring Year	Annual Mean		Class III Standard (62-302 F.A.C.)	Is Outflow Greater Than Inflow?	Is Outflow in Compliance With State Standard?
		Inflow	Outflow			
Alkalinity (mg/L)	2000	226.0	202.7	≥20 mg/L	No	Yes
	2001	219.4	264.5		Yes	Yes
	2002	263.0	249.8		No	Yes
	2003	190.5	210.9		Yes	Yes
Chloride (mg/L)	2000	142.6	137.7	No Class III Numeric Standard	No	N/A
	2001	133.9	156.7		Yes	N/A
	2002	166.5	158.6		No	N/A
	2003	120.1	133.2		Yes	N/A
Soluble Reactive Phosphorus (µg/L)	2000	66.2	8.6	No Class III Numeric Standard	No	N/A
	2001	47.9	6.2		No	N/A
	2002	68.8	9.3		No	N/A
	2003	77.6	26.5		No	N/A
Specific Conductivity (µS/cm)	2000	995.4	995.0	≤1,275 µS/cm	No	Yes
	2001	962.7	1105.2		Yes	Yes
	2002	1162.3	1116.5		No	Yes
	2003	871.3	938.8		Yes	Yes
Total Dissolved Nitrogen (mg/L)	2000	2.7	1.7	No Class III Numeric Standard	No	N/A
	2001	2.3	2.4		Yes	N/A
	2002	2.9	2.4		No	N/A
	2003	2.1	1.8		No	N/A
Total Dissolved Solids (mg/L)	2000	651.5	576.0	No Class III Numeric Standard	No	N/A
	2001	611.8	685.4		Yes	N/A
	2002	749.4	703.8		No	N/A
	2003	568.0	607.5		Yes	N/A
Total Nitrogen (mg/L)	2000	3.4	1.8	No Class III Numeric Standard	No	N/A
	2001	2.8	2.6		No	N/A
	2002	3.0	2.5		No	N/A
	2003	2.5	1.9		No	N/A
Total Phosphorus (µg/L)	2000	150.0	22.0	No Class III Numeric Standard	No	N/A
	2001	94.0	27.6		No	N/A
	2002	112.1	27.7		No	N/A
	2003	147.6	49.0		No	N/A
Turbidity (NTU)	2000	22.0	1.9	≤29 NTU	No	Yes
	2001	9.8	5.6		No	Yes
	2002	6.5	3.6		No	Yes
	2003	21.9	3.3		No	Yes

Table 2: Class III Compliance Test STA 2

Parameters	Monitoring Year	Annual Mean		Class III Standard (62-302 F.A.C.)	Is Outflow Greater Than Inflow?	Is Outflow in Compliance With State Standard?
		Inflow	Outflow			
Alkalinity (mg/L)	2001	263.7	302.2	≥20 mg/L	Yes	Yes
	2002	346.2	306.1		No	Yes
	2003	277.3	280.5		Yes	Yes
Chloride (mg/L)	2001	127.1	282.9	No Class III Numeric Standard	Yes	N/A
	2002	207.8	186.9		No	N/A
	2003	161.2	176.2		Yes	N/A
Soluble Reactive Phosphorus (µg/L)	2001	33.2	6.0	No Class III Numeric Standard	No	N/A
	2002	18.1	5.3		No	N/A
	2003	23.2	5.1		No	N/A
Specific Conductivity (µS/cm)	2001	1071.4	1201.0	≤1,275 µS/cm	Yes	Yes
	2002	1359.7	1275.1		No	No
	2003	1131.3	1187.4		Yes	Yes
Total Dissolved Nitrogen (mg/L)	2001	2.0	2.5	No Class III Numeric Standard	Yes	N/A
	2002	2.7	2.3		No	N/A
	2003	2.4	2.0		No	N/A
Total Dissolved Solids (mg/L)	2001	972.0	889.0	No Class III Numeric Standard	No	N/A
	2002	876.0	790.8		No	N/A
	2003	714.9	751.8		Yes	N/A
Total Nitrogen (mg/L)	2001	2.5	2.6	No Class III Numeric Standard	Yes	N/A
	2002	2.8	2.4		No	N/A
	2003	2.5	2.1		No	N/A
Total Phosphorus (µg/L)	2001	55.1	15.8	No Class III Numeric Standard	No	N/A
	2002	31.3	17.2		No	N/A
	2003	41.4	15.4		No	N/A
Turbidity (NTU)	2001	11.1	1.6	≤29 NTU	No	Yes
	2002	3.9	6.0		Yes	Yes
	2003	3.7	4.0		Yes	Yes

Table 3: Class III Compliance Test STA 5

Parameters	Monitoring Year	Annual Mean		Class III Standard (62-302 F.A.C.)	Is Outflow Greater Than Inflow?	Is Outflow in Compliance With State Standard?
		Inflow	Outflow			
Alkalinity (mg/L)	2000	170.8	235.3	≥20 mg/L	Yes	Yes
	2001	214.1	200.7		No	Yes
	2002	194.6	196.9		Yes	Yes
	2003	191.4	187.6		No	Yes
Chloride (mg/L)	2000	49.8	124.5	No Class III Numeric Standard	Yes	N/A
	2001	70.9	103.8		Yes	N/A
	2002	52.8	76.3		Yes	N/A
	2003	50.6	64.3		Yes	N/A
Soluble Reactive Phosphorus (µg/L)	2000	68.3	200.5	No Class III Numeric Standard	Yes	N/A
	2001	62.1	48.3		No	N/A
	2002	94.6	44.5		No	N/A
	2003	78.4	105.7		Yes	N/A
Specific Conductivity (µS/cm)	2000	506.6	613.9	≤1,275 µS/cm	Yes	Yes
	2001	662.9	742.9		Yes	Yes
	2002	565.2	639.9		Yes	Yes
	2003	544.3	573.5		Yes	Yes
Total Dissolved Nitrogen (mg/L)	2000	1.4	3.3	No Class III Numeric Standard	Yes	N/A
	2001	1.2	2.4		Yes	N/A
	2002	1.3	1.6		Yes	N/A
	2003	1.3	1.6		Yes	N/A
Total Dissolved Solids (mg/L)	2000	332.8	549.8	No Class III Numeric Standard	Yes	N/A
	2001	413.4	469.8		Yes	N/A
	2002	358.7	405.0		Yes	N/A
	2003	355.3	372.6		Yes	N/A
Total Nitrogen (mg/L)	2000	1.6	4.2	No Class III Numeric Standard	Yes	N/A
	2001	1.5	3.1		Yes	N/A
	2002	1.4	1.7		Yes	N/A
	2003	1.5	1.7		Yes	N/A
Total Phosphorus (µg/L)	2000	130.2	282.0	No Class III Numeric Standard	Yes	N/A
	2001	139.7	150.5		Yes	N/A
	2002	154.4	78.8		No	N/A
	2003	168.5	147.0		No	N/A
Turbidity (NTU)	2000	5.4	13.5	≤29 NTU	Yes	Yes
	2001	5.0	10.1		Yes	Yes
	2002	3.5	1.9		No	Yes
	2003	3.8	2.1		No	Yes

Table 4: Class III Compliance Test STA 6

Parameters	Monitoring Year	Annual Mean		Class III Standard (62-302 F.A.C.)	Is Outflow Greater Than Inflow?	Is Outflow in Compliance With State Standard?
		Inflow	Outflow			
Alkalinity (mg/L)	2001	251.4	215.0	≥20 mg/L	No	Yes
	2002	273.3	218.8		No	Yes
	2003	287.6	261.8		No	Yes
Chloride (mg/L)	2001	65.2	63.0	No Class III Numeric Standard	No	N/A
	2002	82.2	78.3		No	N/A
	2003	95.1	96.8		Yes	N/A
Soluble Reactive Phosphorus (µg/L)	2001	18.1	8.2	No Class III Numeric Standard	No	N/A
	2002	12.5	6.4		No	N/A
	2003	15.7	5.8		No	N/A
Specific Conductivity (µS/cm)	2001	711.7	640.8	≤1,275 µS/cm	No	Yes
	2002	848.7	760.9		No	Yes
	2003	869.8	818.4		No	Yes
Total Nitrogen (mg/L)	2001	2.0	1.6	No Class III Numeric Standard	No	N/A
	2002	2.1	1.7		No	N/A
	2003	1.9	1.4		No	N/A
Total Phosphorus (µg/L)	2001	69.3	30.1	No Class III Numeric Standard	No	N/A
	2002	54.9	19.8		No	N/A
	2003	57.3	19.7		No	N/A
Turbidity (NTU)	2001	4.2	1.1	≤29 NTU	No	Yes
	2002	3.6	0.9		No	Yes
	2003	4.3	0.6		No	Yes

The statistical significance of the data was also tested to determine if the previous findings of inflow versus outflow concentrations are relevant to the data sets. In order to ascertain this information, Wilcoxon Signed Ranks Tests were performed on the data sets to verify the significance of the compliance findings. Tables 5 through 8 give the statistical summaries for these four Stormwater Treatment Areas. The one-tailed tests indicate whether a significant difference exists between the inflows and outflows and which has the greater concentration.

Bolded and italicized p-values indicate that a significant difference exists between the inflow and outflow and the "Direction" column indicates where the significance is. For example, STA 1W has a p-value of <0.0001 for Soluble Reactive Phosphorus, and that the inflow is significantly higher than the outflow, (i.e. inflow>outflow).

Where the p-value is greater that 0.05, no statistically significant difference between inflow and outflow concentrations were found.

Table 5: STA 1W Wilcoxon Signed Ranks Test

Parameter	p-Values		Direction
	2-tailed	1-tailed	
Alkalinity	0.1115	0.0558	Not Significant
Chloride	0.3049	0.1525	Not Significant
Total Dissolved Solids	0.6646	0.3323	Not Significant
Specific Conductivity	0.2100	0.1050	Not Significant
Soluble Reactive Phosphorus	*<0.0001*	*<0.0001*	Inflow > Outflow
Total Dissolved Phosphorus	*<0.0001*	*<0.0001*	Inflow > Outflow
Total Phosphorus	*<0.0001*	*<0.0001*	Inflow > Outflow
Total Dissolved Nitrogen	*0.0456*	*0.0228*	Inflow > Outflow
Total Nitrogen	*0.0008*	*0.0004*	Inflow > Outflow
Turbidity	*<0.0001*	*<0.0001*	Inflow > Outflow
Sulfate	*<0.0001*	*<0.0001*	Inflow > Outflow

Table 6: STA 2 Wilcoxon Signed Ranks Test

Parameter	p-Values		Direction
	2-tailed	1-tailed	
Alkalinity	0.0581	*0.0291*	Inflow > Outflow
Chloride	0.6797	0.3399	Not Significant
Total Dissolved Solids	0.2242	0.1121	Not Significant
Specific Conductivity	0.9522	0.4761	Not Significant
Soluble Reactive Phosphorus	*<0.0001*	*<0.0001*	Inflow > Outflow
Total Dissolved Phosphorus	*<0.0001*	*<0.0001*	Inflow > Outflow
Total Phosphorus	*<0.0001*	*<0.0001*	Inflow > Outflow
Total Dissolved Nitrogen	0.0578	*0.0289*	Inflow > Outflow
Total Nitrogen	*0.0461*	*0.0231*	Inflow > Outflow
Turbidity	0.7578	0.3789	Not Significant
Sulfate	0.1842	0.0921	Not Significant

Table 7: STA 5 Wilcoxon Signed Ranks Test

Parameter	p-Values		Direction
	2-tailed	1-tailed	
Alkalinity	0.2545	0.1273	Not Significant
Chloride	*<0.0001*	*<0.0001*	Inflow > Outflow
Total Dissolved Solids	*<0.0001*	*<0.0001*	Inflow > Outflow
Specific Conductivity	*<0.0001*	*<0.0001*	Inflow > Outflow
Soluble Reactive Phosphorus	0.8165	0.4083	Not Significant
Total Dissolved Phosphorus	0.8137	0.4069	Not Significant
Total Phosphorus	0.6957	0.3479	Not Significant
Total Dissolved Nitrogen	*<0.0001*	*<0.0001*	Inflow > Outflow
Total Nitrogen	*<0.0001*	*<0.0001*	Inflow > Outflow
Turbidity	0.4903	0.2452	Not Significant
Sulfate	*<0.0001*	*<0.0001*	Inflow > Outflow

Table 8: STA 6 Wilcoxon Signed Ranks Test

Parameter	p-Values		Direction
	2-tailed	1-tailed	
Alkalinity	*<0.0001*	*<0.0001*	Inflow > Outflow
Chloride	0.8889	0.4445	Not Significant
Specific Conductivity	*<0.0001*	*<0.0001*	Inflow > Outflow
Soluble Reactive Phosphorus	*<0.0001*	*<0.0001*	Inflow > Outflow
Total Phosphorus	*<0.0001*	*<0.0001*	Inflow > Outflow
Total Kjeldahl Nitrogen	*<0.0001*	*<0.0001*	Inflow > Outflow
Total Suspended Solids	*<0.0001*	*<0.0001*	Inflow > Outflow
Turbidity	*<0.0001*	*<0.0001*	Inflow > Outflow
Sulfate	0.0973	*0.0487*	Inflow > Outflow

D. Mercury and Pesticide Programs

Mercury

Larry Fink, the head of the District's Mercury Studies Program, was asked to evaluate the monitoring program from the perspective of cost-effectiveness and to recommend cost saving measures if available. His recommendation follows:

"<u>*Potential for Mercury/Trace Metals Program Cost Savings*</u>

Since there is no Water Quality Standard for Methyl Hg, and since the USEPA Water Quality Criteria for Methyl Hg is based on Total Hg as Methyl Hg in fish, which is the only significant route of exposure, with FDEP concurrence eliminate surface water Methyl Hg monitoring in all of the STAs and increase the mosquito fish monitoring from semi-annually to quarterly. For the non-ECP canal trip, retain Total Hg for purposes of assessing compliance with the existing Class III Water Quality Standard and for mass load calculation but eliminate quarterly surface water Methyl Hg monitoring and substitute quarterly mosquito fish monitoring at each of the 12 routine sampling sites. [Savings: $36K]

With FDEP concurrence, reduce the number of mosquito fish homogenate replicate analyses from n = 3 to n = 1. Archive the remainder, and if and only if the concentration of Total Hg in the homogenate from a particular station exceeds a concentration of concern will the remaining homogenate be sub-sampled n = 3 times for confirmation. [Total Savings: ~$4.5K]

With FDEP concurrence, reduce the number of sunfish and largemouth bass replicates from n = 20 to n = 5 based on nonrandom subsampling of the initial collection of n = 20 sunfish and n = 20 largemouth bass based on size and continue 10% splits, reducing number of splits from 44 each to 11 each for sunfish and bass. Archive the remaining whole fish, and if and only if the average concentration of Total Hg in the whole fish or muscle exceeds a concentration of concern at a particular station will the remaining n = 15 archived samples be analyzed for confirmation and to develop the appropriate size-concentration regression relationships for probabilistic ecological risk assessment exposure calculations. [Total Savings: ~$28.5K]

With Technical Oversight Committee concurrence, eliminate quarterly surface water Methyl Hg monitoring in the un-mandated system characterization sampling sites and substitute quarterly mosquito fish monitoring. [Annual savings: [~$15K]

Total Annual Savings Proposed Changes to Hg Monitoring Program: [~$84K]"

Pesticides

Pesticide sampling has been performed for each of the STA on a quarterly basis since the issuance of their respective permits. Currently, only the herbicides ametryn and atrazine are analyzed. Pesticide sampling at STA 2 was terminated in August, 2002.

An analysis of the outflow concentrations versus the inflow concentrations for both compounds is presented in Table 9.

Table 9: Outflow/Inflow Concentration Comparison

				ametryn		atrazine	
Start date	End date	Site	number events	outflow concentration > inflow concentration	percent	outflow concentration > inflow concentration	percent
5/11/1994	ongoing	STA1W	38	8	21%	8	21%
7/27/2000	8/5/2002	STA2	6	0	0%	2	33%
7/28/1999	ongoing	STA5	17	13	76%	10	59%
1/20/1998	ongoing	STA6	22	9	41%	5	23%
Values based on using 1/2 detection limit for data below the detection limit.							

Although the outflow concentration for both compounds was greater than the inflow concentration at most of the STA, only the ametryn values for STA5 were statistically significant.

Neither ametryn nor atrazine have a promulgated numeric water quality standard (Florida Administrative Code (FAC) 62-302). However, an acute or chronic value can be calculated using procedures outlined in state law (FAC 62-302.200(1) (a) and (4) (a)). This provides for acute and chronic toxicity standards to be calculated as one-third and one-twentieth, respectively, of the lowest 96 hour LC50 for a species significant to the indigenous aquatic community. Table 10 lists these calculated values for these compounds.

Table 10: Toxicity of atrazine and ametryn to freshwater aquatic invertebrates and fishes (ug/L)

	48 hr EC50				96 hr LC50				96 hr LC50			
Name	Water flea *Daphnia magna*		acute toxicity	chronic toxicity	Fathead Minnow (#) *Pimephales promelas*		acute toxicity	chronic toxicity	Bluegill *Lepomis macrochirus*		acute toxicity	chronic toxicity
ametryn	28,000	(2)	9333	1400	-		-	-	4,100	(1)	1367	205
atrazine	6900	(2)	2300	345	15,000	(2)	5000	750	16,000	(1)	5333	800
	96 hr LC50				96 hr LC50				96 hr LC50			
Name	Largemouth Bass *Micropterus salmoides*		acute toxicity	chronic toxicity	Rainbow Trout (#) *Oncorhynchus mykiss*		acute toxicity	chronic toxicity	Channel Catfish *Ictalurus punctatus*		Acute toxicity	chronic toxicity
ametryn	-		-	-	8,800	(1)	2933	440	-		-	-
atrazine	-		-	-	8,800	(1)	2933	440	7,600	(1)	2533	380

(#) Species is not indigenous. Information is given for comparison purposes only.
(1) Hartley, D. and H. Kidd. (Eds.) (1987). The Agrochemicals Handbook. Second Edition, The Royal Society of Chemistry. Nottingham, England.
(2) U.S. Environmental Protection Agency (1991) Pesticide Ecological Effects Database, Ecological Effects Branch, Office of Pesticide Programs, Washington, DC.

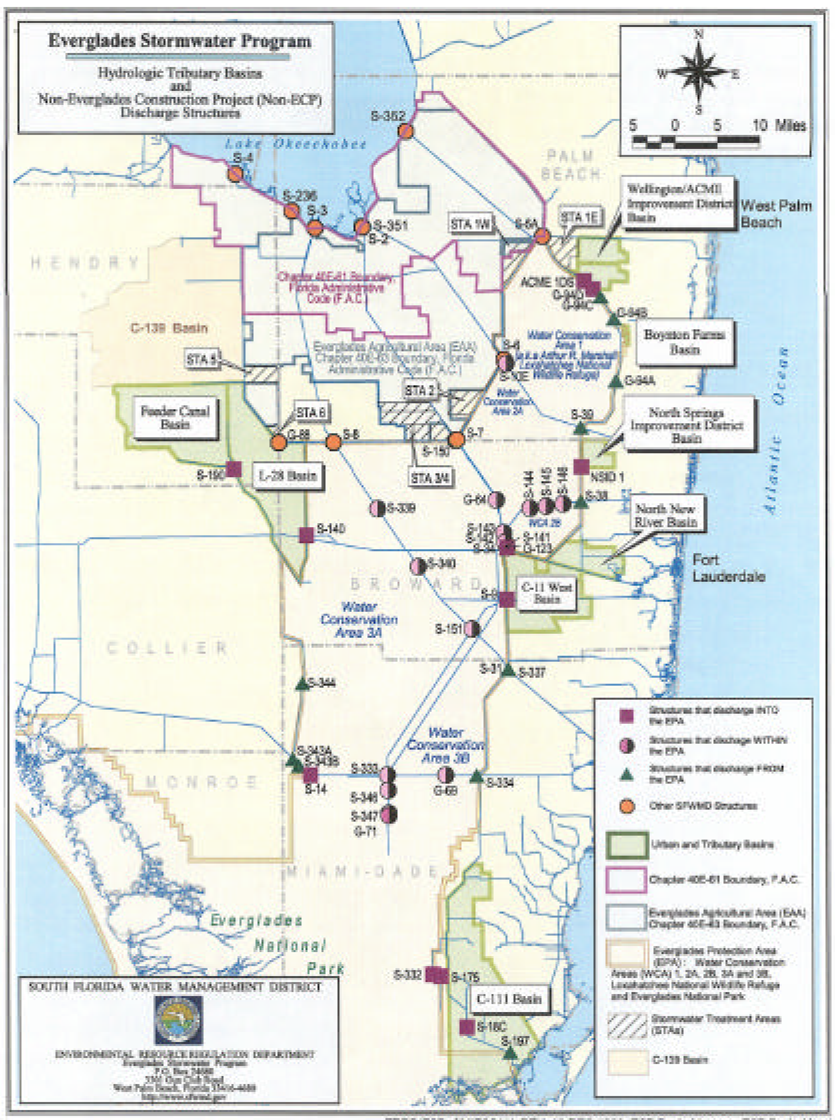
For both compounds, at all the STA, no exceedance of the toxicity standards occurred. The highest outflow concentration of ametryn and atrazine detected at all of the STA is 0.3 and 3.8 µg/L, respectively. Additionally, the Draft EPA water quality criteria for atrazine (EPA 2003) determined a freshwater aquatic life criterion of a one-hour average concentration that does not exceed 1,500 µg/L, more than once every three years on the average.

US EPA (2003) Ambient Aquatic Life Water Quality Criteria for Atrazine – Revised Draft. EPA-822-R-03-023. Office of Water, Washington, D.C.

E. Non-ECP Stormwater Program (DEP Permit 06,502590709)

The Everglades Stormwater Program was established in partial fulfillment of the requirements of the Everglades Forever Act of 1994. A key component was identified as the Non-ECP Stormwater Program in order to distinguish it from the Everglades Construction Project elements. The Non-ECP Program covered the rest of the District, and non-District, facilities that either contributed water to or withdrew water from the Everglades Protection Area (EPA). A categorization of the facilities was constructed in order to distinguish between the functions of the structure in relation to the EPA. This categorization divided structures into 3 categories known as INTO, FROM and WITHIN. The INTO structures were facilities that controlled the discharge of water which entered the EPA. The FROM structures were facilities that withdrew water from the EPA, and the WITHIN structures were those that allowed the movement of water between interior components of the EPA. Figure 16 shows the location of these structures in relation to the EPA.

Figure 16: Non-ECP Facilities Map



ERRD/ESP CM/ESSAU REV. 16-DEC-1999 ESP Basin Map.apr ESP Basin Map-L

A matrix was developed for the Non-ECP permit that showed the monitoring sites and list of parameters required for compliance monitoring. The POP Team reviewed the matrix and discussed the preliminary ecological factors associated with the selection of the parameters for monitoring. For example, the team discussed why we might anticipate seeing no significant variances over time for key parameters associated with a within, inflow, or outflow site. A draft matrix of Potential Reduction Opportunities was then established, which became the targeted parameters for data collection, analysis, and review. Figure 17 is the Reduction Opportunities Matrix that was developed for the Non-ECP permit:

Figure 17: Non-ECP Permit Monitoring Reduction Opportunities

	Parameter	Temperature	Dissolved Oxygen	Specific Conductivity	pH	Turbidity	Color	Total Suspended Solids	Nitrite + Nitrate	Nitrite	Ammonia	Total Kjeldahl Nitrogen	Ortho Phosphorus	Total Phosphorus	Dissolved Silica	Dissolved Sodium	Dissolved Potassium	Dissolved Calcium	Dissolved Magnesium	Dissolved Chloride	Dissolved Sulfate	Hardness	Total Iron	Alkalinity	Total Cadmium	Total Copper	Total Zinc	Total Mercury Filtered	Total Mercury Unfiltered	Detergents	Zinc Phosphide
Site																															
ACME1DS	1	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O				
C123SR84	2	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
G64	3	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
G69	4	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
G94B	5	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
G94D	6	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O				
G123	7	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O				
S9	8	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	X	X		
S9A	9	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O				
S10E	10	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
S11A	11	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
S12D	12	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
S14	13	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O				
S18C	14	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	X	X		
S31	15	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
S34	16	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
S38	17	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
S38B	18	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O				
S39	19	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
S140	20	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	X	X		
S142	21	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
S145	22	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
S151	23	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
S174	24	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O				
S175	25	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O				
S176	26	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	X	X		
S177	27	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	X	X		
S178	28	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	X	X		
S190	29	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O				O
S197	30	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
S331-173	31	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O				
S332	32	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O		
S332D	33								X	O	O	X	O	X																	
S333	34	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O				
S334	35	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
S344	36	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
NSID1	37	X	X	X	X	X		O	X		O	X	O	X				O	O	O		O		O		O				O	
US41-25	38	X	X	X	X	X	O	O	X	O	O	X	O	X	O	O	O			O	O	O		O	O	O	O				
VOW1	39													X																	

VOW2	40												x																		
	O=Potential Reduction Opportunities																														

This matrix identified 20 key parameters (shown as "o"), out of a total of 30, that the POP Team felt could be targets for reduction or removal based upon a detailed analysis of the period of record data. The next step in the process was the retrieval of relevant water quality data from the District's DBHYDRO corporate database. Statistical and comparative analyses were then performed to evaluate compliance of the period of record data (for the key parameters) with state standards (where available).

For example, an analysis of cadmium for the past three years indicated no excursions above the Class III standard (see Figures 18 through 20). (It is instructive to remember that "INTO," "WITHIN," and "FROM" designations refer to the establishment of a monitoring site as being for a facility that discharges, respectively, into, within, or from the Everglades Protection Area.)

Figure 18: Cadmium Data for Non-ECP WITHIN Structures

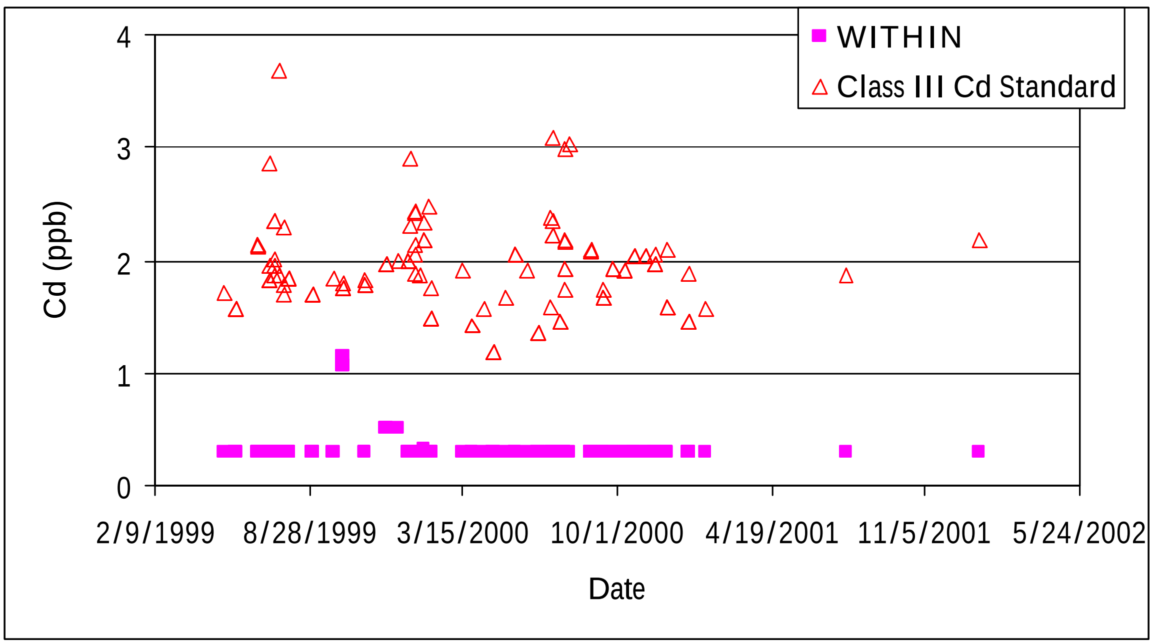


Figure 19: Cadmium Data for Non-ECP FROM Structures

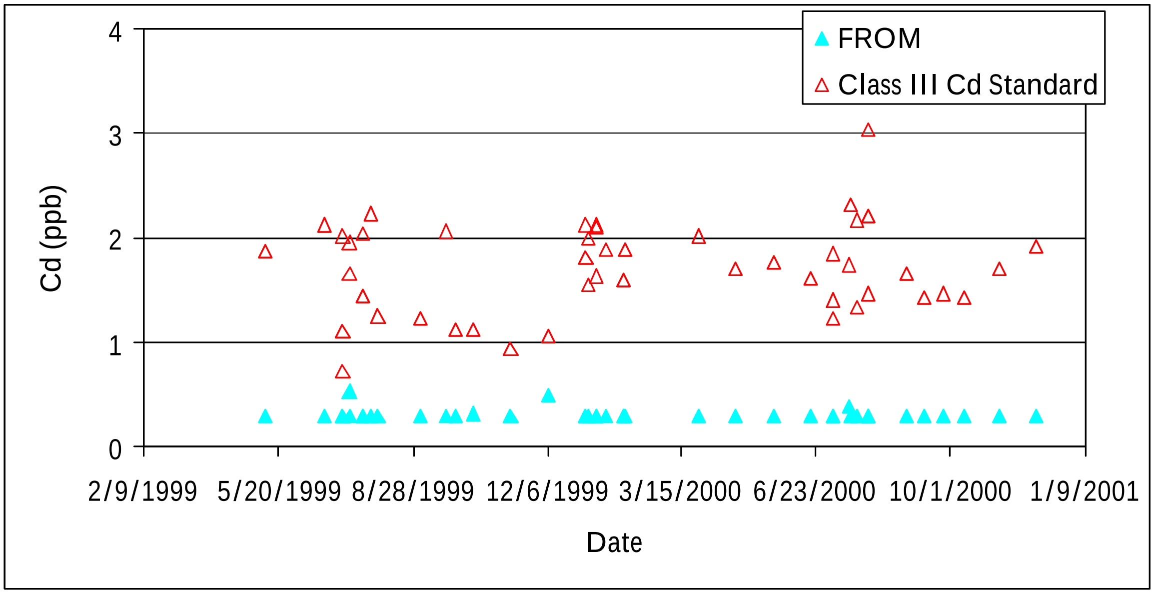
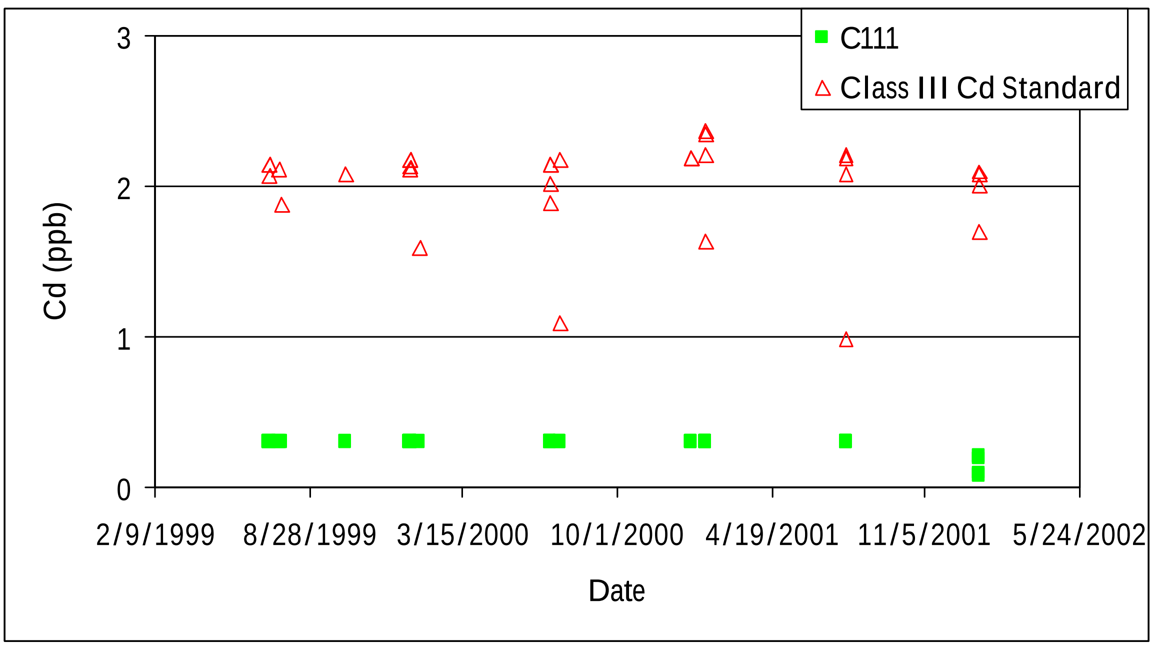


Figure 20: Cadmium Data for C-111



Similar analyses were conducted for copper and zinc. These data are given in Figures 21 through 28.

Figure 21: Copper Data for INTO Structures

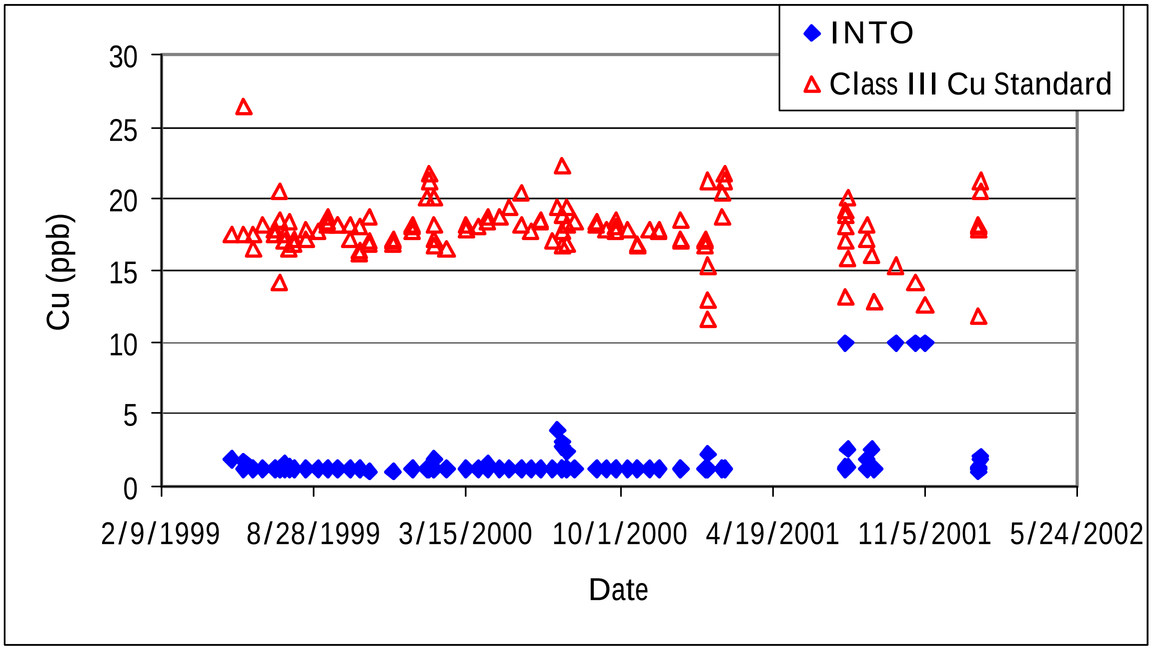

INTO
Class III Cu Standard
Cu (ppb)
30
25
20
15
10
5
0
2/9/1999
8/28/1999
3/15/2000
10/1/2000
4/19/2001
11/5/2001
5/24/2002
Date

Figure 22: Copper Data for WITHIN Structures

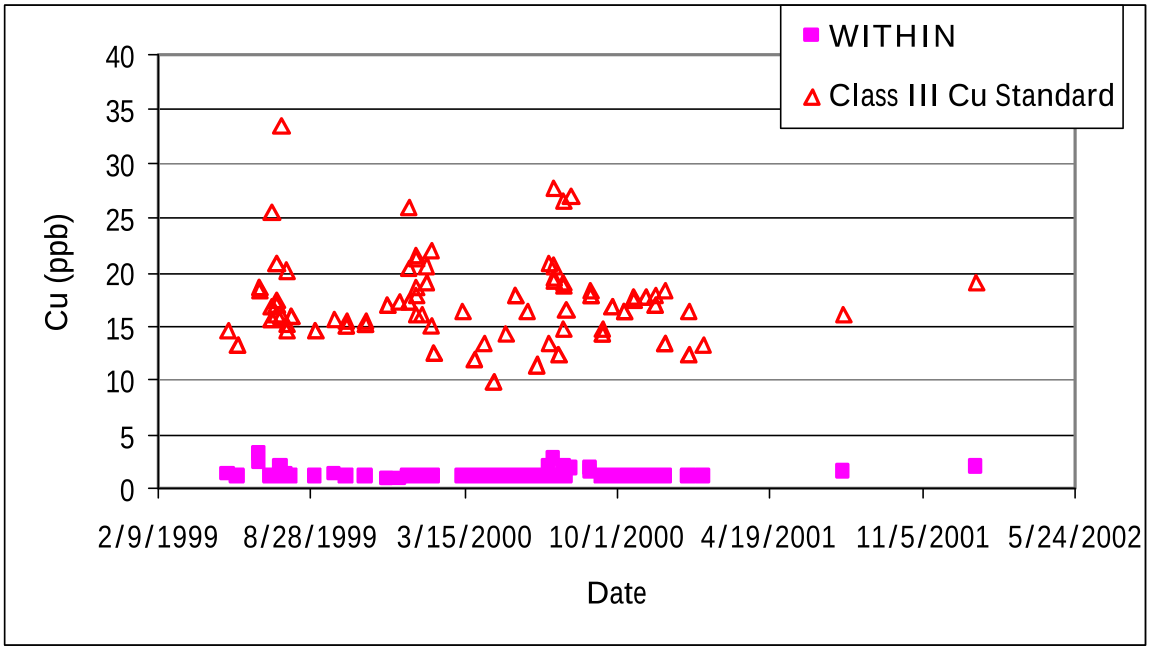


Figure 23: Copper Data for FROM Structures

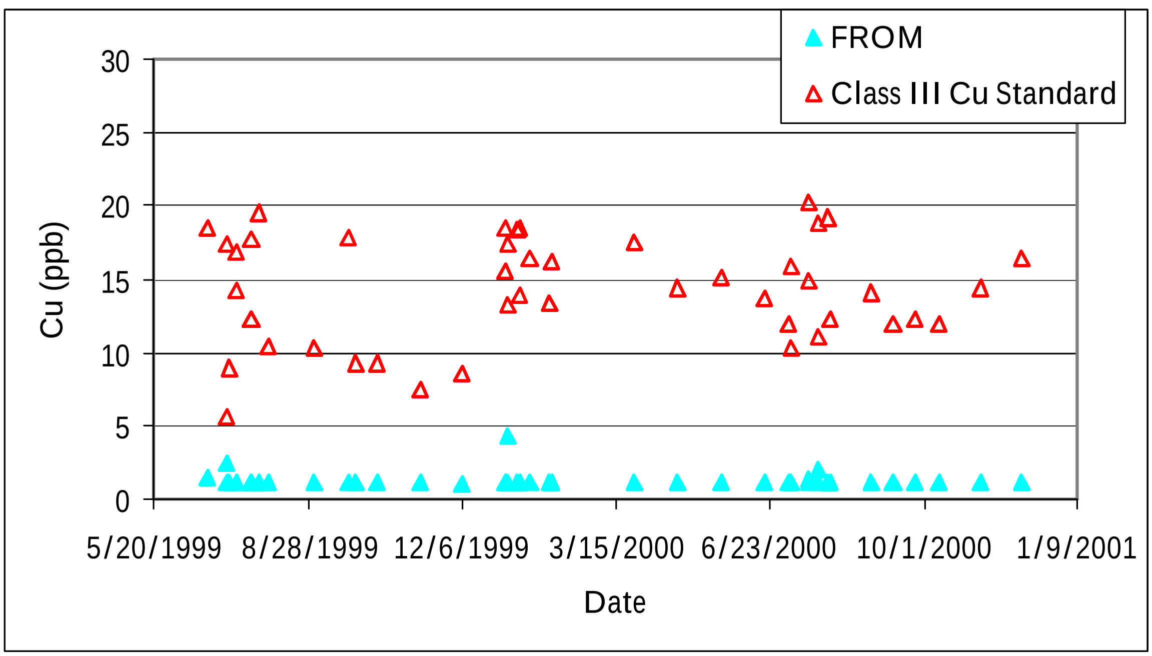


Figure 24: Copper Data for C-111

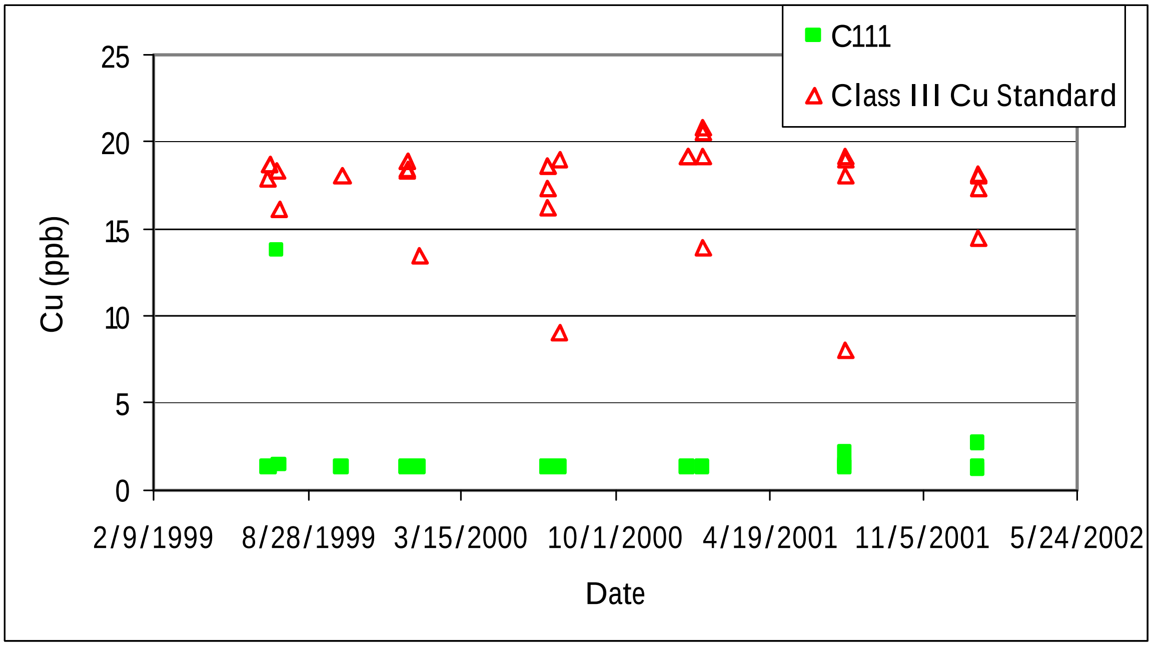


Figure 25: Zinc Data for INTO Structures

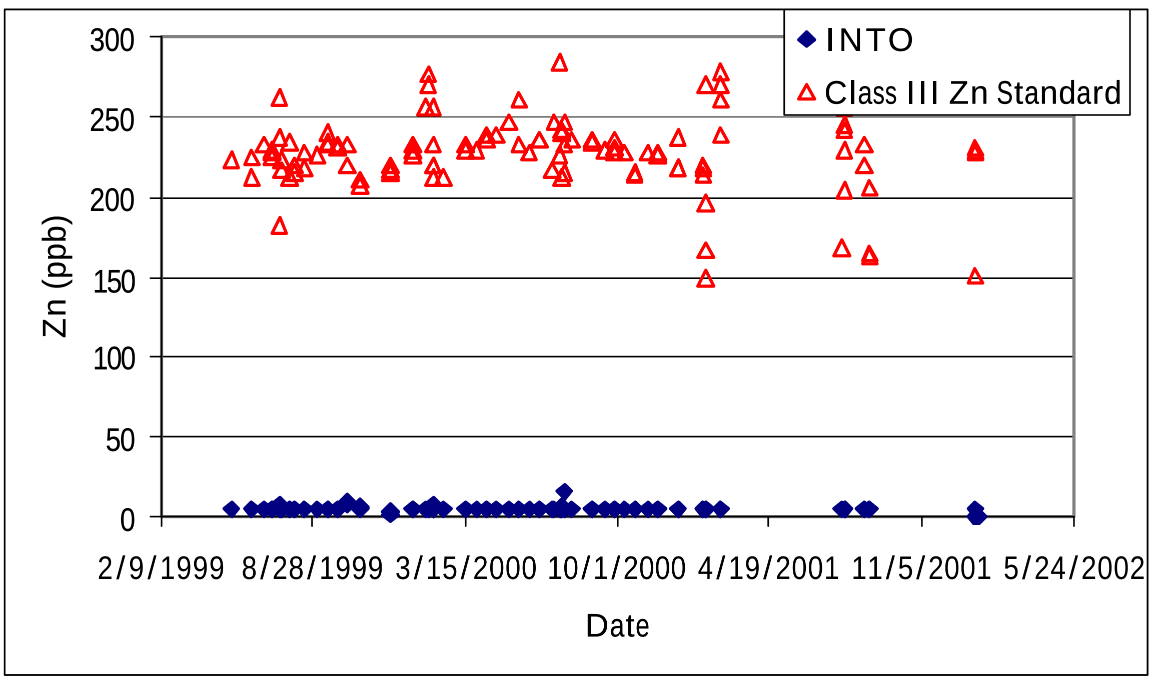


Figure 26: Zinc Data for WITHIN Structures

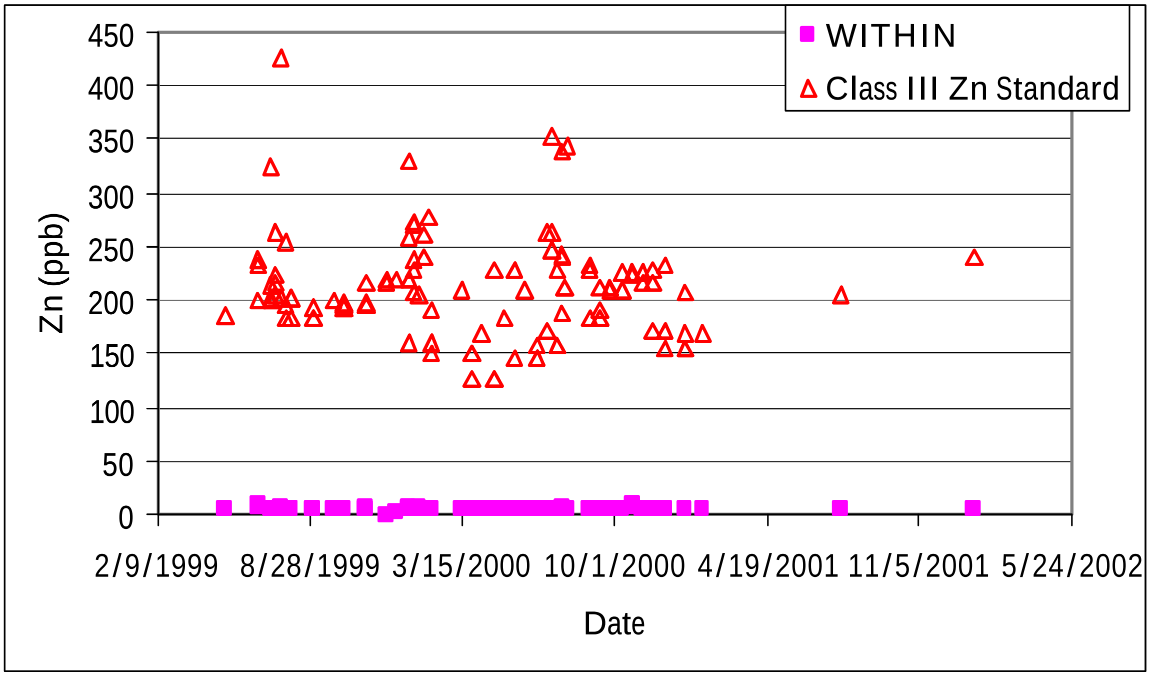


Figure 27: Zinc Data for FROM Structures

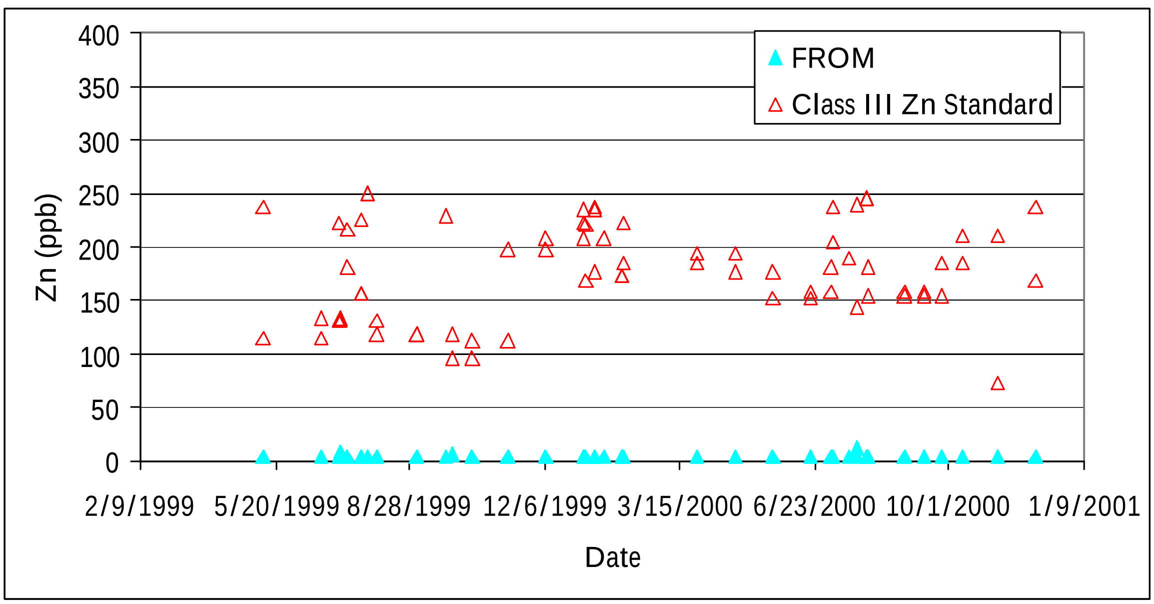
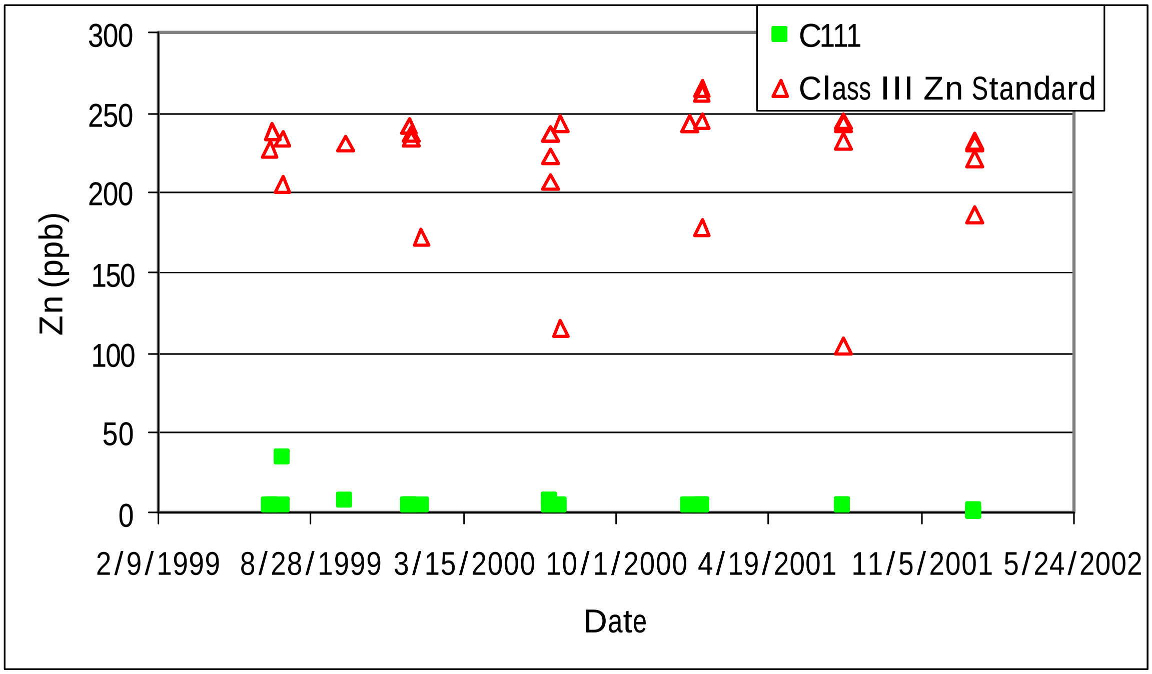


Figure 28: Zinc Data for C-111



For all monitoring sites covered by the Non-ECP permit, analyses were completed to determine total excursions from Class III water quality standards.

The results are shown in detail in Table 11.
`

Table 11
Excursions from Class III criteria for samples collected regardless of flow conditions

Station	Alkalinity	Dissolved Oxygen	pH	Specific Conductivity	Total Cadmium	Total Copper	Total Iron	Total Zinc	Turbidity	Unionized Ammonia	Total	Total (Excluding Dissolved Oxygen)
ACME1DS	0 (93)	44 (93)	1 (93)	0 (93)	0 (13)	0 (12)	0 (26)	0 (12)	0 (93)	0 (92)	45 (620)	1 (527)
C123SR84	0 (142)	106 (143)	1 (146)	0 (145)	0 (12)	0 (12)	0 (29)	0 (12)	2 (141)	0 (139)	109 (921)	3 (778)
G123	0 (83)	77 (115)	0 (116)	0 (115)	0 (12)	0 (12)	0 (28)	0 (12)	0 (83)	1 (82)	78 (658)	1 (543)
G64	0 (83)	79 (83)	0 (83)	0 (83)	0 (7)	0 (7)	0 (13)	0 (7)	0 (83)	0 (83)	79 (532)	0 (449)
G69	0 (1)	1 (1)	0 (1)	0 (1)	0 (0)	0 (0)	0 (1)	0 (0)	0 (1)	0 (1)	1 (7)	0 (6)
G94B	0 (72)	62 (71)	1 (72)	0 (72)	0 (6)	0 (6)	0 (24)	0 (6)	0 (71)	0 (72)	63 (472)	1 (401)
G94D	0 (94)	62 (95)	0 (95)	0 (95)	0 (13)	0 (12)	2 (26)	0 (12)	1 (95)	0 (94)	65 (631)	3 (536)
S10E	0 (128)	95 (123)	0 (122)	7 (124)	0 (9)	0 (9)	0 (29)	0 (9)	5 (130)	1 (121)	108 (804)	13 (681)
S11A	0 (138)	68 (132)	1 (137)	1 (135)	0 (9)	0 (9)	0 (27)	0 (9)	0 (138)	0 (134)	70 (868)	2 (736)
S12D	0 (270)	325 (383)	9 (379)	0 (387)	0 (109)	0 (108)	0 (201)	0 (108)	0 (270)	0 (256)	334 (2471)	9 (2088)
S14	0 (1)	0 (1)	0 (1)	0 (1)	0 (7)	0 (7)	0 (3)	0 (7)	0 (1)	0 (1)	0 (30)	0 (29)
S140	1 (209)	145 (230)	1 (234)	0 (235)	0 (22)	0 (21)	0 (47)	0 (21)	0 (207)	0 (201)	147 (1427)	2 (1197)
S142	0 (102)	84 (99)	0 (102)	0 (101)	0 (6)	0 (6)	0 (12)	0 (6)	0 (102)	3 (102)	87 (638)	3 (539)
S145	0 (174)	110 (166)	1 (173)	0 (172)	1 (12)	0 (12)	0 (34)	0 (12)	0 (174)	0 (169)	112 (1098)	2 (932)
S151	0 (187)	164 (193)	1 (193)	0 (196)	0 (14)	0 (14)	0 (37)	0 (14)	1 (186)	0 (169)	166 (1203)	2 (1010)
S174	0 (0)	31 (34)	0 (33)	0 (31)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	31 (98)	0 (64)
S175	1 (119)	156 (218)	3 (221)	0 (220)	0 (75)	1 (75)	0 (99)	0 (72)	0 (142)	3 (137)	164 (1378)	8 (1160)
S176	0 (177)	187 (199)	3 (202)	0 (203)	0 (50)	0 (50)	0 (146)	0 (50)	1 (199)	8 (191)	199 (1467)	12 (1268)
S177	1 (188)	142 (185)	4 (187)	0 (187)	0 (46)	0 (46)	0 (148)	0 (46)	1 (188)	5 (180)	153 (1401)	11 (1216)
S178	0 (131)	102 (127)	1 (130)	0 (130)	0 (42)	0 (42)	0 (104)	0 (42)	2 (131)	0 (123)	105 (1002)	3 (875)
S18C	0 (236)	159 (281)	6 (284)	0 (284)	0 (114)	0 (113)	0 (196)	0 (111)	0 (236)	2 (221)	167 (2076)	8 (1795)
S190	0 (189)	84 (189)	0 (189)	0 (190)	0 (21)	0 (20)	0 (48)	0 (20)	1 (189)	0 (182)	85 (1237)	1 (1048)
S197	0 (21)	8 (22)	0 (22)	0 (22)	0 (5)	0 (5)	0 (8)	0 (5)	0 (21)	0 (21)	8 (152)	0 (130)
S31	0 (128)	106 (121)	1 (120)	0 (122)	0 (14)	0 (14)	0 (34)	0 (13)	0 (127)	0 (115)	107 (808)	1 (687)
S331-173	0 (144)	147 (151)	0 (151)	0 (150)	0 (7)	0 (7)	0 (15)	0 (7)	0 (143)	0 (144)	147 (919)	0 (768)
S332	0 (248)	269 (325)	4 (328)	0 (328)	0 (122)	0 (121)	3 (228)	0 (121)	0 (290)	8 (276)	284 (2387)	15 (2062)
S332D	0 (65)	184 (203)	0 (205)	0 (203)	0 (9)	0 (9)	0 (18)	0 (9)	0 (87)	0 (87)	184 (895)	0 (692)
S333	1 (245)	355 (425)	7 (424)	0 (429)	0 (105)	0 (105)	1 (200)	1 (106)	0 (246)	0 (232)	365 (2517)	10 (2092)
S334	0 (83)	59 (86)	0 (88)	0 (88)	0 (6)	0 (6)	0 (13)	0 (6)	0 (83)	1 (82)	60 (541)	1 (455)
S34	0 (125)	77 (120)	0 (122)	0 (122)	0 (7)	0 (7)	0 (26)	0 (7)	0 (125)	0 (120)	77 (781)	0 (661)
S344	0 (23)	19 (24)	0 (24)	0 (23)	0 (6)	0 (6)	0 (23)	0 (6)	0 (24)	0 (24)	19 (183)	0 (159)
S38	0 (182)	130 (171)	1 (176)	0 (175)	0 (13)	0 (13)	0 (38)	0 (13)	0 (182)	0 (175)	131 (1138)	1 (967)
S38B	0 (39)	20 (38)	0 (39)	0 (39)	0 (10)	0 (9)	0 (21)	0 (9)	1 (39)	0 (39)	21 (282)	1 (244)
S39	0 (190)	95 (184)	0 (183)	2 (184)	0 (13)	0 (13)	0 (41)	0 (13)	0 (190)	0 (181)	97 (1192)	2 (1008)
S9	0 (190)	329 (357)	0 (365)	0 (365)	0 (26)	0 (26)	0 (46)	0 (26)	0 (187)	0 (179)	329 (1767)	0 (1410)
S9A	0 (3)	34 (40)	0 (43)	0 (43)	0 (0)	0 (0)	0 (0)	0 (0)	0 (12)	0 (13)	34 (154)	0 (114)
US41-25	0 (203)	229 (253)	4 (249)	0 (253)	0 (110)	0 (108)	0 (151)	0 (110)	0 (203)	0 (191)	233 (1831)	4 (1578)
VOW1	0 (0)	8 (12)	0 (12)	0 (12)	0 (0)	0 (2)	0 (0)	0 (0)	0 (0)	0 (2)	8 (40)	0 (28)
VOW2	0 (0)	9 (11)	0 (11)	0 (11)	0 (0)	0 (2)	0 (0)	0 (0)	0 (0)	0 (2)	9 (37)	0 (26)
Total	4 (4706)	4361 (5704)	50 (5755)	10 (5769)	1 (1052)	1 (1046)	6 (2140)	1 (1039)	15 (4819)	32 (4633)		
Percent Exceed	0.1%	76.5%	0.9%	0.2%	0.1%	0.1%	0.3%	0.1%	0.3%	0.7%		

Note: Numbers to the left of parenthesis are the total number of excursions of the Class III criteria for parameters of interest at monitoring stations. Numbers in the parenthesis are the total number of sample collected for parameters of interest at monitoring stations

For all parameters, except dissolved oxygen, excursions from Class III standards occurred less than 1% of the time. The greatest number of excursions was found for pH, at 0.9% or 50 out of 5,755 samples exceeded the standard.

Several physical and operational changes have occurred to the water control system since the original date of permit issuance. Two control structures are no longer functional, S-175 and S-332, and one other, S-14, is not operated at all. Continued sampling of water quality at these sites would produce no useful data on permit compliance.

Therefore, no further monitoring should be required at these 3 structures:

- S-14 – this structure is closed all of the time and no flow occurs
- S-175 – this structure has been bypassed by the south Dade facilities
- S-332 – the levee at this station has been degraded such that flow is overland now

Summary for the Non-ECP Permit

From the previous data analysis it can be seen that fourteen parameters could be removed from the current permit-required monitoring without losing any relevant resource information about the permit compliance of these facilities. The parameters that should be removed are:

- Color
- Total suspended solids
- Nitrite
- Ammonia
- Orthophosphorus
- Dissolved silica
- Dissolved sodium
- Dissolved potassium
- Dissolved calcium
- Dissolved magnesium
- Dissolved chloride
- Dissolved sulfate
- Hardness
- Total iron
- Alkalinity
- Total cadmium
- Total copper
- Total zinc
- Detergents
- Zinc Phosphide

Also, all monitoring should be discontinued at S-14, S-175, and S-332.

F. Holeyland Project (DEP Permits 06,50809209 and 06,501191549)

A matrix was developed for the Holeyland Project permit that showed the monitoring sites and list of parameters required. The POP Team reviewed the matrix and discussed the preliminary ecological factors associated with the selection of the parameters for monitoring. For example, the team discussed why we might anticipate seeing no significant variances over time for key parameters associated with an inflow or outflow site. A draft matrix of Potential Reduction Opportunities was then established which became the targeted parameters for data collection, analysis and review. Figure 29 is the Reduction Opportunities Matrix that was developed for the Holeyland permits:

Figure 29: Holeyland Permit Reduction Opportunities

					Total Nitrogen											
Station	Parameter	pH	Specific Conductivity	Temperature	Nitrate + Nitrite	Total Kjeldahl Nitrogen	*Alkalinity*	*Orthophosphate as P*	Total Phosphorous	*Ammonia*	*Dissolved Calcium*	*Dissolved Magnesium*	*Cadmium*	*Copper*	*Zinc*
G-200A		X	X	X	X	X	O	O	X	O	O	O	O	O	O
G-204		X	X	X	X	X	O	O	X	O	O	O	O	O	O
G-205		X	X	X	X	X	O	O	X	O	O	O	O	O	O
G-206		X	X	X	X	X	O	O	X	O	O	O	O	O	O
O = Reduction Opportunity															

An analysis of the period of record data for conditions when flowing from the area is shown in Table 12.

Table 12 - Holeyland Class III Excursions

Station	Alkalinity	Dissolved Oxygen	pH	Specific Conductivity	Total Cadmium	Total Copper	Total Iron	Total Zinc	Turbidity	Un-ionized Ammonia	Total	Total (Excluding Dissolved Oxygen)
G200	0 (0)	37 (79)	3 (79)	0 (80)	0 (12)	0 (11)	0 (7)	0 (12)	0 (6)	0 (13)	40 (299)	3 (220)
G204	0 (0)	2 (3)	0 (3)	0 (3)	0 (3)	0 (3)	0 (1)	0 (3)	0 (1)	0 (3)	2 (23)	0 (20)
G205	0 (0)	0 (1)	0 (1)	0 (1)	0 (2)	0 (2)	0 (1)	0 (2)	0 (0)	0 (1)	0 (11)	0 (10)
G206	0 (0)	5 (5)	0 (5)	0 (5)	0 (1)	0 (1)	0 (1)	0 (1)	0 (1)	0 (1)	5 (21)	0 (16)
Total	0 (0)	44 (88)	3 (88)	0 (89)	0 (18)	0 (17)	0 (10)	0 (18)	0 (8)	0 (18)		
Percent Exceed	0.0%	50.0%	3.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		

Except for dissolved oxygen and pH there were no excursions above the Class III water quality standards for the other monitored parameters.

Summary for the Holeyland Project

From the previous data presentation it can be seen that eight parameters could be removed from the current permit-required monitoring without losing any relevant resource information about the permit compliance performance of this project. The parameters that should be reduced are:

- Alkalinity
- Orthophosphorus
- Ammonia
- Dissolved calcium
- Dissolved magnesium
- Cadmium
- Copper
- Zinc

Now that Stormwater Treatment Area 3/4 is complete, water from the Everglades Agricultural Area is no longer expected to flow through the Holeyland. Therefore, it may be possible to discontinue all required monitoring for these permits.

G. New Projects with Start-Up Monitoring

The difference between the STAs and the new projects is that the permitted monitoring has really only just begun, and it could seem counter productive to stop before starting in this situation. However, what this perspective does is give the District and the FDEP an opportunity to agree on an early cessation of monitoring for specific parameters should the premises prove true.

1. Taylor Creek/Nubbin Slough (LOPA Permits 0194483-002-GL and 0194485-002-GL)

A matrix was developed for the Taylor Creek/Nubbin Slough Projects permit that showed the monitoring sites and list of parameters required. The POP Team reviewed the matrix and discussed the preliminary ecological factors associated with the selection of the parameters for monitoring. Consideration was given to the “lessons learned” from the previous permitted projects in identifying those parameters that would probably not yield relevant data or reasonably be expected to show any unusual trends. A draft matrix of Potential Reduction Opportunities was then established as shown in Figure 30.

Figure 30: Taylor Creek/Nubbin Slough Permit Reduction Opportunities

						Total Nitrogen										
	Parameter	Dissolved Oxygen	pH	Specific Conductivity	Temperature	Nitrate + Nitrite	Total Kjeldahl Nitrogen	*Alkalinity*	*Dissolved Chloride*	*Orthophosphate as P*	*Total Dissolved Solids*	*Turbidity*	Total Phosphorous	*Ammonia*	*Total Suspended Solids*	*Total Copper*
Station																
<u>Taylor Creek STA</u>																
Inflow		X	X	X	X	X	X	O	O	O	O	O	X	O	O	O
Outflow		X	X	X	X	X	X	O	O	O	O	O	X	O	O	O
<u>Nubbin Slough STA</u>																
Inflow		X	X	X	X	X	X	O	O	O	O	O	X	O	O	O
Outflow 1		X	X	X	X	X	X	O	O	O	O	O	X	O	O	O
Outflow 2		X	X	X	X	X	X	O	O	O	O	O	X	O	O	O
Outflow 3		X	X	X	X	X	X	O	O	O	O	O	X	O	O	O
O= Reduction Opportunity																

From the discussions of previously permitted monitoring programs it can be seen that eight parameters could be considered for removal from the current permit-required monitoring without losing any significant resource information about the performance of these facilities. The parameters that should be reviewed and considered for removal after 6 to 12 months of data collection are:

- Alkalinity
- Dissolved chloride
- Orthophosphorus
- Total Dissolved Solids
- Turbidity
- Ammonia
- Total Suspended Solids
- Total Copper

2. Pilot Project (DEP Permit EI 50-0188365-002)

Due to the unique nature of this project and its associated hydrogeology, the permitting for this has involved multiple levels of authorization, beginning with a testing phase, a pilot phase, and an operational phase. The samples have been and will be collected in the future at sites near the water storage pits, as shown at the left, and at sites somewhat remote from the site to identify background and/or downstream water quality conditions and effects. The early sampling did not produce enough quality data to positively state that the project would or would not have any significant water resource impacts. This is why it is being authorized and implemented in a phased, or adaptive, manner.

A matrix was developed, see Figures 31 and 32, for the L-8 Pilot Project permit that showed the monitoring sites and list of parameters required. The POP Team reviewed the matrix and discussed the preliminary ecological factors associated with the selection of the parameters for monitoring.

Figure 31: L-8 Reservoir Testing Project Permit Reduction Opportunities

					Total Nitrogen									
	Dissolved Oxygen	pH	Specific Conductivity	Temperature	Nitrate + Nitrite	Total Kjeldahl Nitrogen	*Nitrite*	*NO2*	*NH4*	*Alkalinity*	*Color*	*Silica*	*Sulfate*	*Sulfide*
Station														
Primary WQ Monitoring														
S-5AW					X	X		X	X	X	X	X	X	X
S-5AS					X	X		X	X	X	X	X	X	X
S-5AE					X	X		X	X	X	X	X	X	X
C-10A	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Site 1	X	X	X	X	X	X				X	X			
Site 2	X	X	X	X	X	X				X	X			
Site 3	X	X	X	X	X	X				X	X			
Secondary WQ Monitoring														
Site 4	X	X	X	X	X	X				X	X			
Site 5	X	X	X	X	X	X				X	X			
Site 6	X	X	X	X	X	X				X	X			

Figure 32: L-8 Reservoir Testing Project Permit Reduction Opportunities

	Total Iron	*Total Copper*	*Cadmium*	*Arsenic*	*Zinc*	*Dissolved Chloride*	*Orthophosphate as P*	*Total Dissolved Solids*	*Total Suspended Solids*	*Turbidity*	Total Phosphorous	*Ammonia*	*Fecal Coliform*	*Total Coliform*	*Gross Alpha*	*Mercury*
Station																
Primary WQ Monitoring																
S-5AW	X					X	X		X	X	X					
S-5AS	X					X	X		X	X	X					
S-5AE	X					X	X		X	X	X					
C-10A		X	X	X	X	X	X	X	X	X	X	X				X
Site 1	X	X		X		X	X	X		X	X		X	X	X	
Site 2	X	X		X		X	X	X		X	X		X	X	X	
Site 3	X	X		X		X	X	X		X	X		X	X	X	
Secondary WQ Monitoring																
Site 4	X	X		X		X	X	X		X	X		X	X	X	
Site 5	X	X		X		X	X	X		X	X		X	X	X	
Site 6	X	X		X		X	X	X		X	X		X	X	X	

There are a lot of the same parameters that were required for the other permits. These parameters should be considered by DEP for deletion after review of 6 to 12 months of sample data.

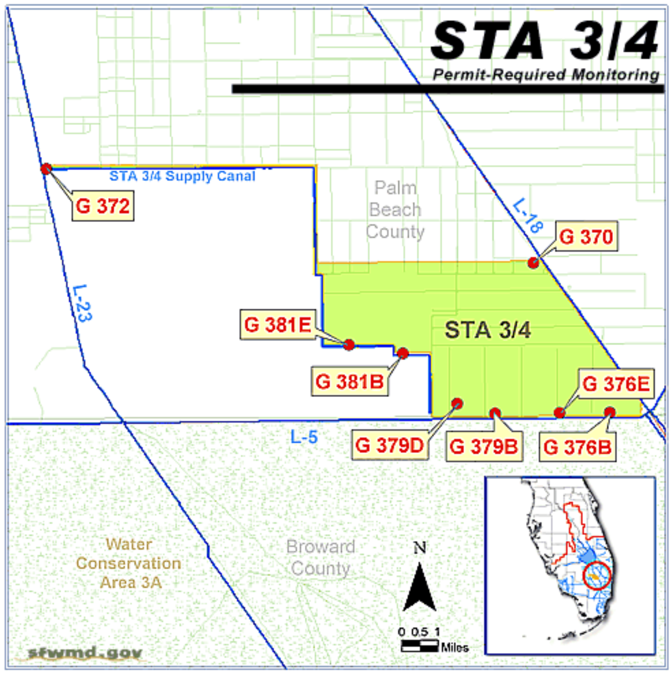
From the previous discussions the team has identified seven parameters that could be considered for removal from the current permit-required monitoring program without losing any significant resource information about the performance of this water supply storage facility. The parameters that should be reviewed and considered for removal after 6 to 12 months of data collection are:

- Alkalinity
- Color
- Total Iron
- Total Copper
- Orthophosphorus
- Total Dissolved Solids
- Turbidity

3. Stormwater Treatment Area 3/4 (DEP Permit FL0300195)

This Stormwater Treatment Area 3/4 Project (STA 3/4 Project) is one of the ECP projects included in the Everglades restoration effort, pursuant to section 373.4592 (4) of the Everglades Forever Act. The STA 3/4 Project consists of the STA 3/4 Works, STA 3/4 Supply Canal, G-371 and G-373 Diversion Structures, U.S. Highway 27 Bridges, STA 3/4 West L-5 Canal including associated components along the L-5 borrow canal, and Pump Stations G-370 and G- 372. The project is monitored in accordance with NPDES permit # FL0300195 and EFA permit #0192895 from the Florida Department of Environmental Protection (FDEP). The permits include specific conditions requiring the District to monitor water quality at the inflow and outflows of the project.

Figure 33



Project Location

The project is located within the south-central portion of the Everglades Agricultural Area and includes works in wetlands and Class III fresh waters within the southern most portion of Palm Beach County, Florida, see Figure 33. The STA (STA 3/4) is located on 16,544 acres of lands located just north of the L-5 canal, directly north of the Palm Beach County line, extending from the Holeyland Wildlife Management Area eastward to U.S. Highway 27 (North New River Canal.

NPDES permit # FL0300195

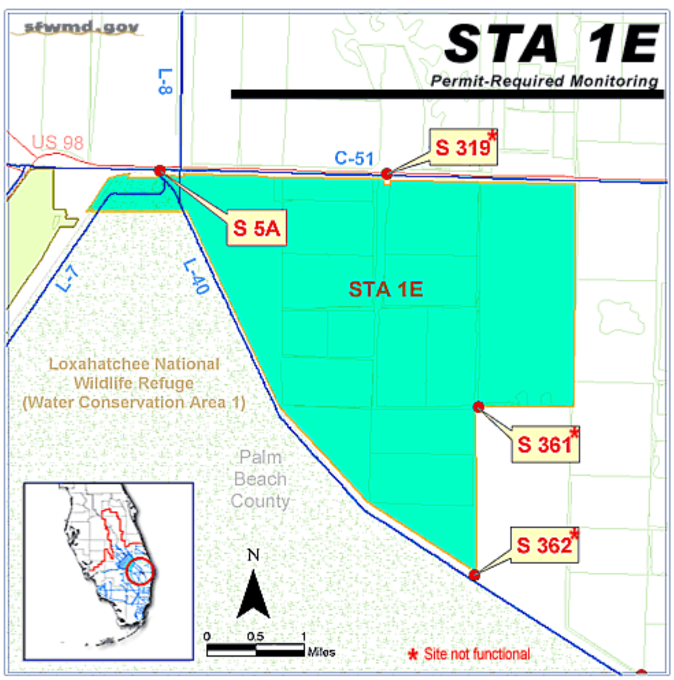
This permit was issued under the provisions of Chapter 403, Florida Statutes, and applicable rules of the Florida Administrative Code and constitutes authorization to discharge to waters of the state under the National Pollutant Discharge Elimination System (NPDES). The permit authorizes the District to construct, operate and maintain Stormwater Treatment Area 3/4 (STA 3/4). This permit also authorizes the new discharge of treated stormwater from a 16,544 acre constructed wetland marsh system (STA 3/4 Project) to WCA-2A and WCA-3A. Treated water from STA 3/4 will be discharged into the L-5 Borrow Canal from the G-376 A-F, G-379 A-E and G-381 A-F structures, and subsequently will be pumped to the North New River Canal by means of existing pump stations S-7, to the Miami Canal by existing pump station S-8 and to western WCA-3A by pump station G - 404. Treated water from STA 3/4, once discharged into the L-5 Canal can also be released to WCA-3A via structure S-150 when water levels in the canal are higher than the downstream water level in WCA-3A. Stormwater treated in the wetland marsh system are pumped, via the G-370 and G-372 inflow pump stations, from the North New River and Miami Canals. Presently, untreated runoff from the S-7/S-2 and S-8/S-3 basins drains into these canals to be routed to the water conservation areas. Stormwater runoff from these basins that is currently flowing untreated will, upon completion of the STA, be diverted into the constructed wetland for treatment utilizing natural, passive physical and biological processes for nutrient removal and water quality improvement.

A review of the parameters and results will occur after 12 months of water quality data has been collected.

4. Stormwater Treatment Area 1 East (DEP Permit FL0195030)

The STA 1E is located in Palm Beach County Florida, immediately east of the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) and the STA 1 Inflow and Distribution Works (STA 1 Inflow Basin), see Figure 34. STA 1E is comprised of Inflow Pumping Stations S-319 and S-361, Gated Spillway G-311, STA 1 E Interior Works, C-51 Basin Divide Structure S-155A, C-51 Canal Improvements and STA 1 E Outflow Pumping Station S-362. The project will be monitored in accordance with a NPDES and EFA permit from the Florida Department of Environmental Protection (FDEP). These permits are not yet issued.

Figure 34



NPDES permit

The individual components included in this application are as follows: STA 1E Inflow Pumping Stations S-319 and S-361, Gated Spillway G-311, STA 1 E Interior Works, C-51 Basin Divide Structure S-155A, C-51 Canal Improvements and STA 1 E Outflow Pumping Station S-362. This permit has not yet been approved. STA 1E construction is close to being completed. This STA is designed to treat stormwater runoff from the C-51 West drainage basin and part of the runoff from the Pump Station 5A basin. The U.S. Corps of Engineers is expecting to begin filling Cells 1, 2, 3 and 4 North by March 15, 2004. The Corps is also expecting to have a completed application from the Florida Department of Environmental Protection by mid-March for operating the system. The initial operation will be to pass water from the C-51 Canal through a treatment cell comprised of emergent vegetation and then through a cell containing submerged vegetation. The last cell in the treatment train will be a field-scale periphyton dominated stormwater treatment cell, commonly called a PSTA. To date only groundwater in the vicinity of STA 1E has been sampled.

A review of the parameters and results will occur after 12 months of water quality data has been collected after the start-up sampling and associated operational criteria have occurred and the facility begins normal operations.

H. Future Permit Optimization Opportunities

In addition to the economic benefits gained by reducing the number of parameters monitored and analyzed, there is also the potential to save costs if the FDEP concurred with a reduction in the frequency of sample collection. Originally it was felt that perhaps a sample every month would suffice for compliance purposes. However, after a review of the technology constraints associated with the quality of samples it was decide to explore the potential for changing a weekly sampling scenario to one that only collects data on a bi-weekly basis. In order to establish the viability and to test the desirability of this scenario a Demonstration Project is proposed to be conducted over the next year. This demonstration is described in some detail below.

Frequency Reduction Demonstration Project

Reduction of Frequency of Autosampler (190 water quality monitoring sites) From Weekly To Every Other Week and Elimination of Grab Samples

Proposed by: Bahram Charkhian

Project Manager: Bahram Charkhian

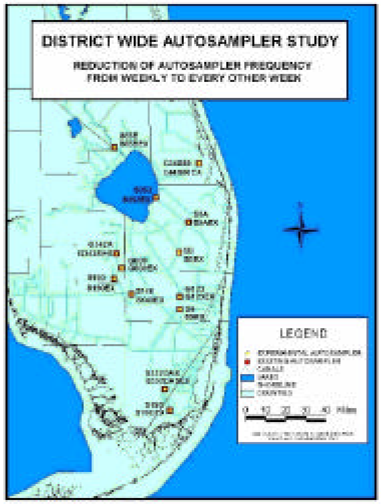
Implementation Team: Water QUALITY monitoring Division Staff

The main objective of this study is to reduce the frequency of the sample collection at 180 + water quality monitoring sites from weekly to every other week.

Hypothesis:

Flow proportional automatic water samplers with composite samples collected over a two-week period will not have significantly different Total Phosphorus concentrations to composite samples collected weekly

Area of the study



Objectives

- Maintain data integrity
- Decrease flow proportional sample collection ; analysis ; QA/QC; reporting ;and storage data costs
- Facilitate realignment of staff in EMA and contracts

Process:

- Generated GIS maps which depict the 14 most strategically located sampling stations, stations which represent multiple projects & permits
- Confirmed the selected stations (14 water quality monitoring sites were selected)
- Develop execution schedule
- Write contract SOW for A/S and platform installation
- Contractor installs second sampler at selected study stations
- Collect and analyze “side by side” data for one year
- Create and distribute monthly data report, with quantified TP concentration differences

Product

- Produce final report of study results.

Impact

- Rulemaking
- Permit challenges and EFA 40E-63
- Load calculation

Constraints

- Limited number of staff available to conduct collection

Assumptions

- The “side by side” hardware can be installed in a timely manner
- Test ability of auto sampler to provide sample volume +/- 5% for reduced volume aliquot
- That collection of automatic samplers bi weekly will cost less than weekly collection

Duration of the Study

Eight months

Resources or needs:

- 0.5 FTE (Field staff) to collect samples in phase 1 and phase 2 of this study (WQMD staff)
- 0 .2 FTE Water Quality Monitoring Field Project Manager
- FTE QA/QC staff to review analytical report
- FTE Nenad & Steve Hill (Statistical evaluation)
- FTE District Lab
- Outsourcing the installation of the side by side autosampler (there main objective would be to make sure that both systems would trigger at the same time and volume of the flow would be the same.).

Section 4
COST ESTIMATES

This section discusses the process taken to estimate the economic value of the proposed optimization actions. During the previous phase of this project it was necessary to estimate the cost of the existing monitoring requirements. To do this, an Excel® spreadsheet was constructed for each of the major permit-required monitoring programs. These spreadsheets were then populated with regional unit cost information obtained from previous studies, reports and the on-going EMA initiative to estimate the true costs for the long-term EFA Program.

After reviewing the permits that the District has obtained to date, costs for major permit-required monitoring programs were prepared in Excel® spreadsheets. It was determined that eight projects and initiatives resulted in significant monitoring expenditures. These eight are:

1) Stormwater Treatment Area 1 West (STA 1W)
2) Stormwater Treatment Area 2 (STA 2)
3) Stormwater Treatment Area 5 (STA 5)
4) Stormwater Treatment Area 6 (STA 6)
5) The Holeyland Project
6) The Non-ECP Program
7) The Lake Okeechobee Operating Permit (LOOP)
8) The 1991 Settlement Agreement

These projects were required to have detailed water level, flow and quality monitoring programs by either the permits or court order. Within the Excel® spreadsheets are detailed data listing the name of each monitoring station as well as the frequency and number of parameters to be sampled.

The costs associated with monitoring for compliance with permit requirements are not normally detailed within the District's financial system. In an effort to better define permit monitoring costs, previous studies and best available information were obtained from interviews and the published budget data. For example, in August of each year the District submits a report to the Governor's Office (pursuant to Section 373.536, F.S.) called the Standard Format Tentative Budget Submission. Among other things, this report includes a section on water management performance measures. One of the key measures is the cost-per sampling event for water resources monitoring and lab analysis.

For each of the eight major programs, unit costs were estimated and these values were applied to the cost models in order to capture the sampling frequency and parameter variations. The cost models, which are in the form of computer spreadsheets, can be used to estimate the costs associated with:

- Deleting a station
- Adding a station
- Reducing the frequency of collection
- Increasing the frequency of collection
- Reducing the number of parameters analyzed
- Increasing the number of parameters analyzed
- Changing the parameters analyzed

The cost models developed can also be used to test the cost effectiveness of various optimization options and “what-if” scenarios. Using the cost models, the costs associated with the current permit requirements can be estimated, compared with the budget and further calibrated. This assignment did not include detailed optimization review of either the Lake Okeechobee Operating Permit or the monitoring associated with the Everglades Settlement Agreement. The cost of permit-required monitoring for the remaining six of these eight major programs for FY04 was estimated to be:

1) STA 1W $489,190
2) STA 2 $843,574
3) STA 5 $620,614
4) STA 6 $199,545
5) Holeyland $25,989
6) Non-ECP $695,036

Total FY04 Costs for six programs = $2,873,948

In the previous sections we discussed, in detail, opportunities for reduction of monitoring parameters for these major programs. As mentioned it was decided to not pursue reductions in the monitoring, at this time, for either the Lake Okeechobee Operating Permit (LOOP) or the Everglades Settlement Agreement. These two programs could obviously benefit from the same type of analyses but it was felt that that with the multitude of parties and issues involved any concurrence on a reduction scheme would take considerable time.

The other reduction/optimization issue that we evaluated was the reduction in sample frequency. In the Situation Assessment Report (SAR) it was suggested that reducing the frequency of sampling from bi-weekly to monthly might be feasible. The District has determined that with current technology, and associated sample holding times, the best we could reasonably accomplish in the future would be reducing weekly sampling down to bi-weekly. The District is undertaking a demonstration project, as described previously, over the next year to determine the feasibility and associated data quality impacts of this type of change. Subsequently, this option is only included in the cost estimations as a potential future consideration.

As an example of the process used to estimate the economic value of the sample parameter reductions we will use the spreadsheet model developed for STA 1W. By incorporating the detailed data and unit cost information developed by the District for both hydrologic data collection and processing and water quality data collection and processing we were able to assign a respective unit cost to each of the stations and sampling events for the STA 1W permit. From the spreadsheet model for STA 1W, found in Appendix 1, it can be seen that the annual cost of monitoring, without reductions, for a site is equal to:

$$C = [(F(e)*C(n))+(F(e)*P(e)*(R(n)+A(n)))]$$

Where C = Annual Cost to Monitor for a Site
F(e) = Existing Frequency of Site Visits
C(n) = Unit Cost for Collection of Samples
P(e) = Existing Number of Parameters Analyzed
R(n) = Unit Cost of Reporting per Parameter
A(n) = Unit Cost of Analysis per Parameter

And for a permit the annual cost to monitor is simply the sum of the individual sites costs to monitor:

$$C(p) = ?\ [(F(e)*C(n))+(F(e)*P(e)*(R(n)+A(n)))]$$

Where n = 1 to x (number of sites per permit)

It is important to keep in mind that there are many costs associated with the collection, analysis and reporting of water quality data that are being lumped into these unit costs in order to keep the number of factors at a manageable level for quick estimation purposes. For example, the unit cost of collection includes the associated costs of the District for utilization, replacement and annual maintenance of the vehicle used to collect the data which may be a car, boat, airboat and/or helicopters. It also includes the cost of supplies required for collection which includes the bottles, forms, fuel and/or special chemicals and gloves and protective clothing. Of course, included in the collection cost is the cost of personnel to perform the collection. This may include contract personnel, in-house staff, included are salaries, overhead, travel time and other indirect costs. The collection method may vary considerably based upon location and type of sample.

Likewise, the unit costs for water quality analysis include a large number of activities not normally understood in the initial review of the unit values. Within the analysis unit cost are the costs for contractor and/or District staff laboratory analysis, supplies, equipment, staff time, overhead, equipment, computers, programming, data QA/QC, database management and maintenance, etc. So, even though the unit cost values may appear high, it important to keep in mind all of the various components and variables that are lumped within the value.

The computation of the unit costs requires the identification of the sites, frequencies of sampling, and parameters required for each permit-required monitoring program. If we review the spreadsheet for STA 1W, we find that there are 36 site visits per year for mercury sample collection and 312 site visits for other sample collections. For each site we can multiply the number of site visits per year (F(e)), times the number of parameters analyzed per site visit (P(e)), and then total. We find that for the STA 1W permit-required monitoring there are 52 parameter/visit combinations, (F(e)*P(e)), for mercury and 1,742 parameter/visit combinations for the other parameters of interest per year.

The next critical piece of data necessary for computation of lumped unit costs is to utilize the District's FY04 budgeted numbers for Program/Task Bf80, ECP Permit-required Monitoring. Fortunately, these budget values have already been broken down by collection, analysis and reporting cost categories. As an example of the use of this data, we will compute the unit cost of water quality data collection at STA 1W for routine water quality parameters. There is $88,582 budgeted for routine parameter water quality data collection for STA 1W in FY04. If we divide this number by the annual number of site visits for routine parameter collection, 312 site visits, (? [F(e)]), in accordance with the permit for STA 1W, we arrive at a cost per collection event of $283.92 [$88,582/312 = $283.92]. If we continue for each of the factors in the spreadsheet we can generate a table of unit costs for STA 1W permit-required monitoring for FY04 as shown in Appendix 1. By performing these same computations for the permit-required monitoring programs of the other STAs yields the individual data sets in Appendix 1.

Applying each of the unit cost values computed as previously described to the permit-required monitoring program for STA 1W yields a completed costing model as shown in the Appendix. The resulting computation shows that an estimate of the cost for permit-required monitoring for STA 1W in FY04 is approximately $490,000. This correlates well with the budget amounts for this activity, BF80.

The next step in the estimation process was to identify those stations and sampling events that would have fewer parameters and samples under the previously described parameter reduction scenarios. The computed unit cost numbers previously computed and reconciled to the FY04 budget are then applied to the monitoring sites considering a reduction in either number of site visits or number of parameters, or both.

The detailed spreadsheet for STA 1W which gives a side-by-side comparison for three scenarios is included in the Appendix. The result of reducing the number of parameters analyzed for STA 1W in accordance with the discussions in this report is a new cost of monitoring, in FY04 dollars, of about $409,000. This represents a reduction in annual costs to the District of about $80,000.

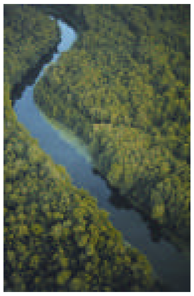
The spreadsheet also includes a potential future scenario where sampling frequency could be reduced from weekly to bi-weekly, assuming a positive result is found within the next year as part of the demonstration project. The new reduced costs for STA 1W would be approximately $344,000. This represents another potential $65,000 in reduced annual operating costs.

Using the same analytical processes for the other projects and permits yields the complete data sets given in the Appendix. The detailed spreadsheets for each scenario are contained in Appendix 1 of this report.

Figure 35 – Summary of Costs Associated with Reduction Strategies

Impact of Parametric & Frequency Reductions on Permit Monitoring Costs						
	Monitoring Program Costs			Potential Savings		
Project	FY04 Annual Costs	Reduced Parameter Annual Costs	Reduced Frequency Annual Costs	Annual Parameter Savings	Annual Frequency Savings	TOTAL Percent Savings
STA 1W	$ 489,190	$ 409,066	$ 343,997	$ 80,124	$ 65,069	29.7%
STA 2	$ 843,574	$ 731,845	$ 643,840	$ 111,729	$ 88,005	23.7%
STA 5	$ 620,614	$ 503,731	$ 400,710	$ 116,883	$ 103,021	35.4%
STA 6	$ 199,545	$ 146,531	$ 132,405	$ 53,014	$ 14,126	33.6%
Non-ECP	$ 695,036	$ 447,978	$ 447,978	$ 247,059	$ -	35.5%
Holeyland	$ 25,989	$ 23,736	$ -	$ 2,253	$ 23,736	100.0%
Total	$ 2,873,948	$ 2,262,886	$ 1,968,930	$ 611,062	$ 293,956	31.5%
Total Savings (parametric & frequency) = $ 905,019						

The overall effect of making the parameter reductions recommended in this report would be annual savings of just over $611,000. The effect of changing sampling frequencies for these projects from weekly to bi-weekly, in the future, would potentially yield another $294,000 in savings per year, for an overall program cost savings of more than $900,000.



Section 5
SUGGESTED GUIDELINES FOR CERP PROJECT MANAGERS

The CERP initiatives could dramatically increase the workload for mandated monitoring at the District. With this in mind, the POP Team looked at opportunities to organizationally streamline the permitting process for CERP projects.

This section of the report gives an overview of the permitting process that was developed for CERP based on state and federal regulatory authorizations which the District must adhere to with regards to permitting the CERP initiatives and coordination with the various agencies involved in the development of a CERP project. It should be noted that although this process has been developed for obtaining a CERP Regulation Act (CERPRA) Permit, the process could be adapted to any type of permit that the District is required to obtain.

A. State and Federal Regulatory Authorizations

Chapter 373, Florida Statutes (F.S.)

Chapter 373, F.S., addresses the state's policy concerning water resources. This includes the permitting of consumptive uses of water, artesian wells and reclaimed water; the regulation of water wells in the state; environmental resources permitting; and the finance and taxation issues relation to funding the resource programs of the state.

Section 373.026, F.S.

Section 373.026 F.S. requires FDEP to collaborate with the SFWMD on the Restudy. Before any project component is submitted to Congress for authorization or receives additional appropriation of state funds, FDEP must approve with amendments, each project component within 60 days following formal submittal. FDEP's approval shall be based upon the District's compliance with Section 373.1501(5), F.S.

Section 373.1501, F.S.

Section 373.1501, F.S. provides a legislative finding that the Restudy is important for sustaining the environment, economy, and social well being of south Florida. This statute authorized the SFWMD to act as a local sponsor for all project features previously authorized by Congress and project components.

Sub-part 373.1501(5)(c) F.S. requires that reasonable certainty be provided to FDEP to document that all project components are consistent with applicable law and regulations, and can be permitted and operated as proposed. In the development of project components, the District is required to:

1. Analyze and evaluate all needs to be met in a comprehensive manner and consider all applicable water resource issues, including water supply, water quality, flood protection, threatened and endangered species, and other natural system and habitat needs.

2. Determine with reasonable certainty that all project components are feasible based upon standards engineering practices and technologies and are the most efficient and cost-effective of feasible alternatives or combination of alternatives, consistent with restudy purposes, implementation of project components, and operation of the project.

3. Determine with reasonable certainty that all project components are consistent with applicable law and regulations, and can be permitted and operated as proposed. For purposes of such determination, the District is required to convene a *pre-application conference* with all federal, state and local agencies with applicable regulatory jurisdiction. Agencies with applicable regulatory jurisdiction shall participate in the pre-application conference and provide information necessary for the District's consistency determination.

4. Provide reasonable assurances that the quantity of water available to existing legal users shall not be diminished by implementation of project components so as to adversely impact existing legal users, that existing level of service for flood protection will not be diminished outside the geographical area of the project component, and that water management practices will continue to adapt to meet the needs of the restored natural environment.

5. Ensure that implementation of project components is coordinated with existing utilities and public infrastructure and that impacts to, and relocation of, existing utility or public infrastructure are minimized.

Section 373.470, F.S.

Section 373.470 F.S., which is known as the Everglades Restoration Investment Act, provides further analysis of the agreements for CERP project components and allocation of CERP project benefits. Sub-section 373.470(3)(a) F.S. states the legislative intent that a full and equal partnership be established between state and federal governments for the implementation of the comprehensive plan. Sub-section 373.470(3)(b) recognizes the need for continuing effort to ensure that all project components achieve the purposes identified in Water Resources Development Act (WRDA) 1996, including restoration, preservation, protection of the ecosystem, protection of water quality, reduction of losses of fresh water from the Everglades and other features as are necessary to meet other water-related needs of the region, including flood control and enhancement of water supply.

Sub-section 373.470(3)© requires that the District, in cooperation with the Corps, complete a Project Implementation Report (PIR) to address a particular project component's economic and environmental benefits, engineering feasibility, and other factors provided in Section 373.1501 sufficient to allow the district to obtain approval under Section 373.026. In accordance with this sub-section, PIR is to be completed prior to executing project cooperation agreements with the Corps for the construction of a project component. In addition, s. 373.470(3)© states that each project implementation report shall also identify the increase in water supplies resulting from the project component, and that the additional water supply shall be allocated or reserved by the district under chapter 373.

State Water Quality Certification

In accordance with Section 401 of the Clean Water Act (CWA), State Water Quality Certification (WQC) is required prior to federal sponsorship of project elements which may impact waters of the state. Additionally, in accordance with Section 1341 of the CWA, applicants for federal licenses or permits which may discharge into navigable waters shall provide the agency a State WQC, prior to receiving the federal license or permit

In addition to the CWA requirements, WRDA 2000 has recognized the need to protect water quality at the point of discharge from authorized project features. Specifically, Section 601 states that "The Secretary (of the Army) shall take into account the protection of water quality by considering applicable State water quality standards and include such features as the Secretary determines are necessary to ensure that all ground water and surface water discharges from any project feature authorized by this subsection will meet applicable water quality permitting requirements."

At the State level, Section 373.1502(3)(b)(2) F.S. states that "State water quality standards will be met to the maximum extent practicable. Under no circumstances shall the project component cause or contribute to violation of state water quality standards."

In light of the federal requirements, state requirements, and the 2000 USACE/SFWMD CERP design agreement, CERP project elements shall be designed so as to not cause or contribute to violation of state water quality standards. Moreover, the design of CERP project elements shall take into account the improvement and protection of water quality, and shall meet state water quality standards to the greatest extent practicable. Details on how the foregoing will be accomplished will be developed within the PIR Phase, and documented within the PIR. For CERP project elements, the Department's shall conduct their WQC review concurrently with their review under s. 373.1502, F.S. (CERP Regulatory Act), s. 373.4595 F.S. (Lake Okeechobee Protection Act), or s. 373.4592 F.S. (Everglades Forever Act), as applicable. Issuance of permits under the aforementioned statutes shall be considered final agency action, and shall constitute State WQC for CERP project elements.

It is important to note that the District is presently looking to the Department to clearly identify the applicable water quality standards and discharge targets which will be applied to the various CERP project elements. Moreover, the District is also presently looking to the Department to identify the reasonable assurances necessary to demonstrate consistency with the applicable water quality standards and discharge targets. The Department's early Identification of applicable water quality standards, discharge targets, and required reasonable assurances would be consistent with collaboration requirements within Section 373.026(8)(b), and would aid in ensuring "to the greatest extent practicable that project components will go forward as planned." It is important to note that the Corps policy requires that the appropriate water quality certification be issued before scheduled construction, and that WQC issuance is a target for federal PIR approval.

State water quality certification is generally issued in association with state permits. A CERPRA Permit will be issued for the construction, operation, maintenance, repair and rehabilitation of CERP project elements.

Comprehensive Everglades Restoration Plan Regulation Act (CERPRA) Permitting

Sub-section 373.1502(3)(b), F.S. authorizes the Department to issue permits for the construction, operation, or maintenance of CERP project components under CERPRA unless the project component is otherwise subject to 373.4592 (EFA), s. 373.4595 (LOPA), or the DEP's rules on reuse of reclaimed water (Chapter 62-610 F.A.C.). The Department shall issue a CERPRA permit/WQC for a term of 5 years once the applicant has provided reasonable assurances that;

1. The project components will achieve the design objectives set forth in the detailed design documents submitted as part of the application.

2. State water quality standards will be met to the maximum extent practicable, and the project component will not cause or contribute to violation of state water quality standards.

3. Discharge from the project components will not pose a serious danger to the public health, safety, or welfare.

4. Any impacts to wetlands or threatened or endangered species resulting from implementation of the project component will be avoided, minimized, and mitigated as appropriate.

It is anticipated that the above reasonable assurances will be provided as an integral part of the PIR Phase. To this end, the PIRs will contain sufficient information to allow the Department to fully evaluate the various CERP project elements, resulting in timely CERPRA Permit issuance upon completion of the PIR.

In accordance with s. 373.1502(3)(a) F.S., with exception of federally delegated or approved permitting programs (e.g. NPDES), permits issued pursuant to Section 373.1502 F.S., are in lieu of all other permits/authorizations required under Chapter 373 or Chapter 403 of the Florida Statutes. Thus, traditionally required Environmental Resource Permits (ERPs) for activities within wetlands or other surface waters will not be required for construction and operation of the CERP project elements.

In the case where the District decides to expedite the design and construction process prior to the completion of the PIR, such as with the three upcoming critical reservoir projects, then the "1501" and "1502" processes will be completed early and incorporated into the final PIR document.

B. CERP Permit Water Quality Monitoring Plan Process (CERP WQMPP)

The CERP Permit WQMPP is written to ensure all necessary water quality components, coordination and products under a CERP Permit will be planned, implemented and assessed to achieve the State's water quality objectives within the Sec. 373.1501 application and within Section 373.1502 of the Comprehensive Everglades Restoration Plan Regulation Act (CERPRA).

The WQMPP is designed to be used by project and program managers for the production of environmental data of known quality and to fulfill the water quality monitoring objectives of the permit. The quality of data is known when precision, accuracy, comparability, completeness and representative ness are documented. The CERP Permit WQMPP relies upon the quality standard for environmental programs as specified in the ANSI/ASQC Standard E4 document and EPA's data Life Cycle (See Figure 36: The Permit Data Life Cycle).[1]

The overlying structure of the WQMPP highlights the policy mandates, includes the coordination required in processing a CERPRA permit, outlines the District's program responsibilities for CERP permits and finally details the overall monitoring component of the project. Within the project, the data cycle consists of planning, implementation, assessment and reporting. (See Figure 37: CERP Permit Water Quality Monitoring Plan Process).

[1] The EPA Quality System, EPA QA/G-0 Final. August 1997 and EPA memorandum of April 17, 1984 by Alvin Alm, Deputy Administrator.

Figure 36: The Permit Data Life Cycle

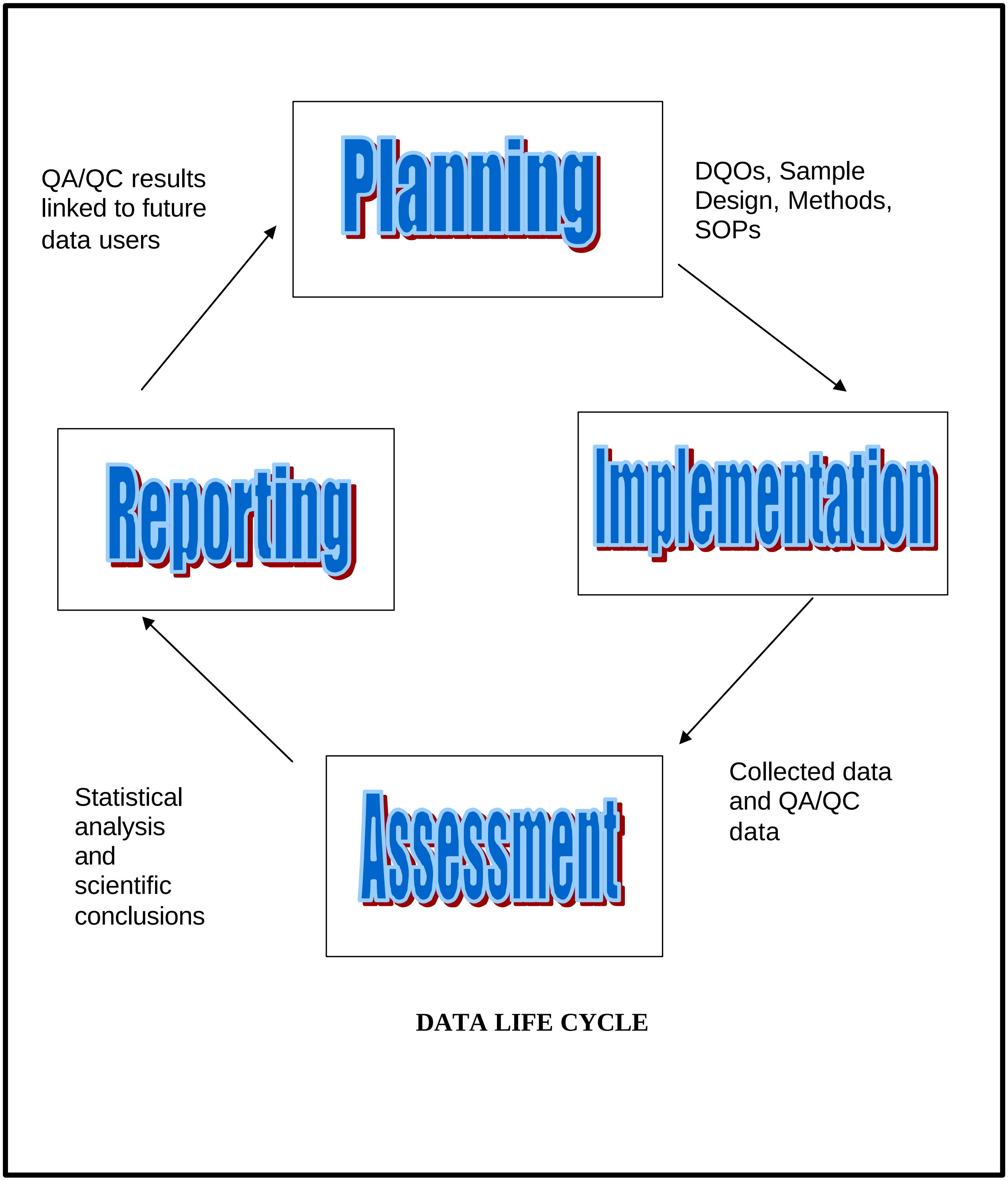

Planning
DQOs, Sample Design, Methods, SOPs
Implementation
Collected data and QA/QC data
Assessment
Statistical analysis and scientific conclusions
Reporting
QA/QC results linked to future data users
DATA LIFE CYCLE

Figure 37

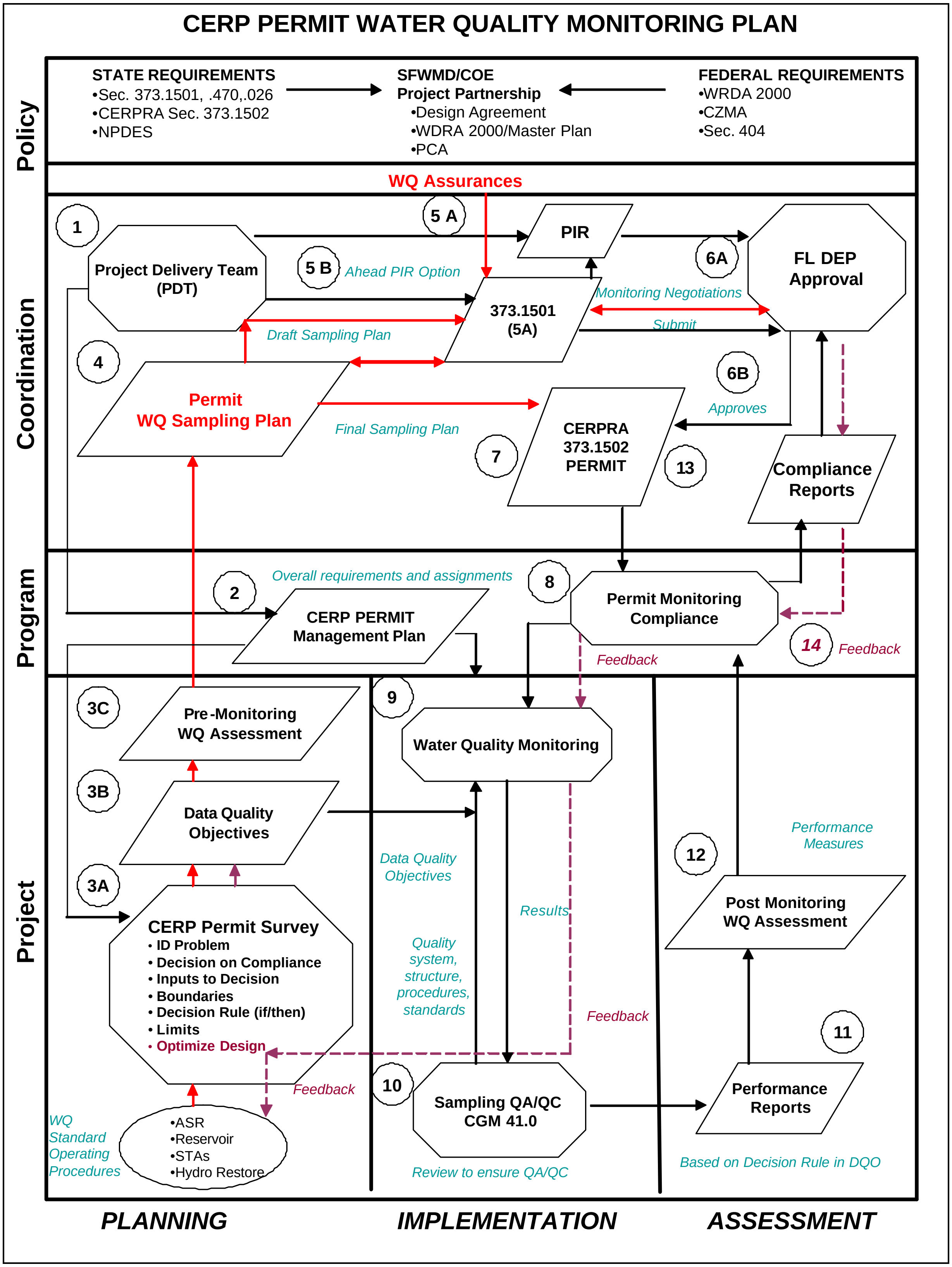
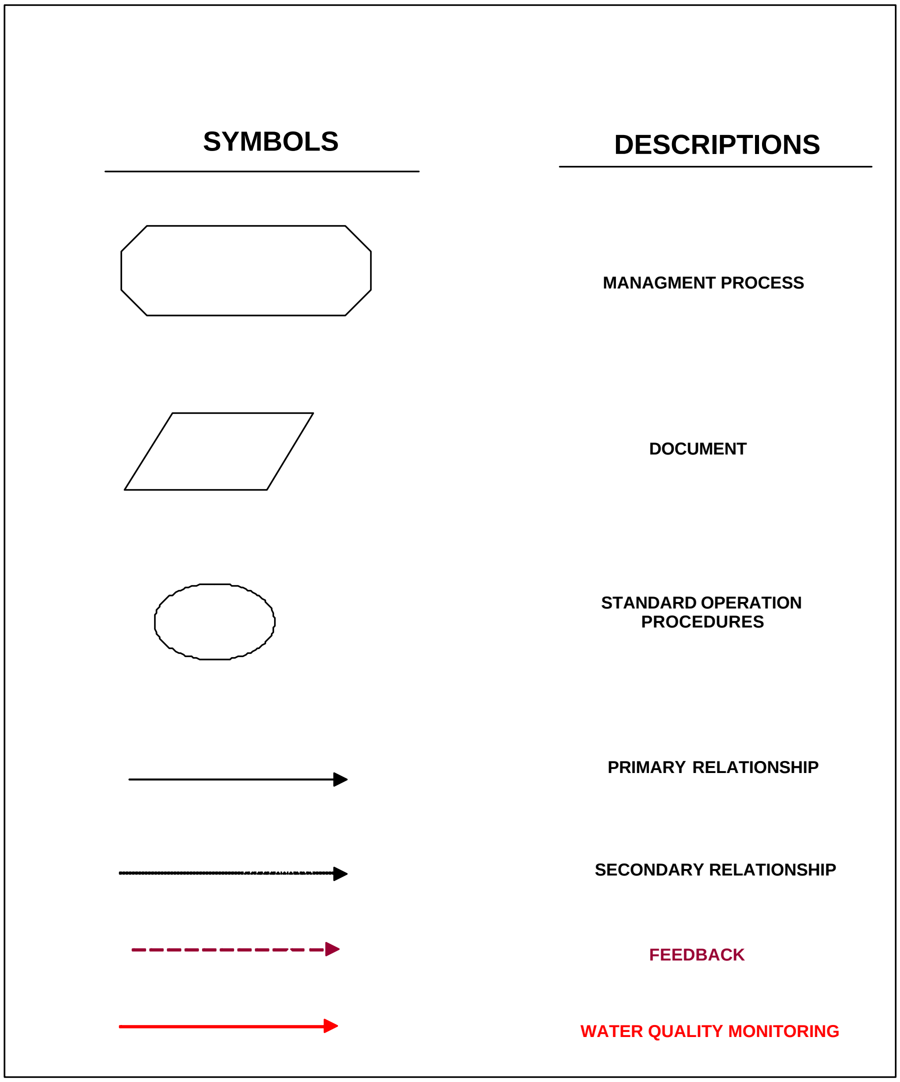

CERP PERMIT WATER QUALITY MONITORING PLAN
Policy
STATE REQUIREMENTS
•Sec. 373.1501, .470,.026
•CERPRA Sec. 373.1502
•NPDES
SFWMD/COE
Project Partnership
•Design Agreement
•WDRA 2000/Master Plan
•PCA
FEDERAL REQUIREMENTS
•WRDA 2000
•CZMA
•Sec. 404
WQ Assurances
Coordination
1
Project Delivery Team (PDT)
5 A
PIR
6A
FL DEP Approval
5 B
Ahead PIR Option
373.1501 (5A)
Monitoring Negotiations
Submit
Draft Sampling Plan
4
Permit WQ Sampling Plan
6B
Approves
Final Sampling Plan
7
CERPRA 373.1502 PERMIT
13
Compliance Reports
Program
2
Overall requirements and assignments
CERP PERMIT Management Plan
8
Permit Monitoring Compliance
14
Feedback
Feedback
Project
3C
Pre-Monitoring WQ Assessment
9
Water Quality Monitoring
3B
Data Quality Objectives
Data Quality Objectives
Results
Performance Measures
12
3A
CERP Permit Survey
• ID Problem
• Decision on Compliance
• Inputs to Decision
• Boundaries
• Decision Rule (if/then)
• Limits
• Optimize Design
Quality system, structure, procedures, standards
Feedback
Post Monitoring WQ Assessment
11
Feedback
10
Sampling QA/QC CGM 41.0
Performance Reports
WQ Standard Operating Procedures
•ASR
•Reservoir
•STAs
•Hydro Restore
Review to ensure QA/QC
Based on Decision Rule in DQO
PLANNING
IMPLEMENTATION
ASSESSMENT

Figure 38: CERP Permit WQMPP Legend



Goals and Objectives

The goal of WQMP is to assure the planning, implementation and assessment of water quality data work will meet the applicable CERP permit compliance in the most efficient and cost effective manner. The objective of the plan is to combine the roles, responsibilities of CERP managers to produce a framework for water quality planning, implementation and assessment. This plan is intended to be both dynamic and iterative.

The Objectives of the CERP Permit WQMPP are to properly coordinate, manage, review and report data collected throughout the span of the Permit.

Figure 37: CERP Permit Water Quality Monitoring Plan depicts the process specifically detailed for water quality monitoring requirements on CERP permits. Permit compliance will be the responsibility of the South Florida Water Management District (District). This diagram is intended to build upon the EPA Data Life Cycle using District specific documents, processes, Standard Operation Procedures (SOPs), and relationships. The diagram depicts the order in which the documents, reports, and actions are enacted to ensure quality control and quality assurances. The overall structure is comprised of four (4) levels; policy, coordination, program, and project.

Within the project level there are three (3) primary areas of responsibilities; planning, implementation and assessment.

The <u>Policy Level</u> is not specifically assigned a responsibility step as it outlines the given federal and state requirements as well as project partnerships that have already been instituted for CERP Projects. For the Federal interest these include; Water Resource Development Act (WRDA) of 2000, the Coastal Zone Management Act (CZMA) and Section 404 of the Clean Water Act (CWA). The State interests are; Sec. 373.1501, 470.025, Comprehensive Everglades Restoration Plan Regulation Act (CERPRA) Sec. 173.1502, and the National Pollutant Discharge Elimination System (NPDES). The State/Federal partnerships' interests include; the CERP Design Agreement, WRDA 2000, The CERP Master Plan, Project Cooperation Agreement (PCA) and water quality assurances. It is imperative that each of these interests be included from the beginning to ensure fulfillment of the CERPRA requirements.

<u>Coordination Level</u> is perhaps the most challenging, as all of the overlying policy requirements must come together with the interested stakeholders to fulfill the CERPRA requirements and obtain state approval for the permit. The State approval process consists of meeting all the requirements of Section 373.1501. Sub-part 373.1501(5)(c) requires that reasonable certainty be provided to Florida Department of Environmental Protection (FDEP) to document that all project components are consistent with applicable laws and regulations, and can be permitted and operated as proposed. Coordination with Federal and State regulatory agencies with jurisdiction, local government and interested stakeholders within the project area is essential in fulfilling Sub-part 373.1501(c).

STEP 1

The first step of the CERP Permit Water Quality Monitoring Plan (WQMP) is the formulation of the Project Delivery Team (PDT) to ensure inclusion of all interested stakeholders. Coordination of Team members must begin early and continue throughout all stages of the permit planning. An identification of the stakeholders may include, but not be limited to:

- South Florida Water Management District
- US Corps of Engineers
- Environmental Protection Agency
- Department of Interior
- FL Department of Environmental Protection
- Miccosukee Tribe of Indians of Florida
- Seminole Tribe of Florida
- Florida Fish and Wildlife Conservation Commission
- Florida Department of Transportation
- FL State Historical Preservation Officer
- FL Department of Agriculture and Consumers Services
- Natural Resource Conservation Services
- Local governments
- Local Drainage Districts

Once the stakeholders have been brought together as members of the PDT, the planning of the project begins. The initial goal of this planning process is to deliver certain written water quality assurances, to Florida Department of Environmental Protections (FDEP) for approval of the Permit.

The most critical part of this CERP WQMPP is to make sure that a draft Water Quality Sampling Plan is included initially as part of the State approval requirements. By including this draft sampling plan in the early stages of the project, a dearly defined process of planning, implementation and assessment of data can be assured in the most cost and time effective manner possible. The additional benefit of stakeholders' participation in this initial planning process will assure overall success of the CERP Permit WQMP.

STEP 2

Once the broad scope of the CERP permit has been defined through the functions of the PDT, the second step of the CERP WQMPP is ensure the data management process is clearly defined. The CERP Permit WQ Management Guidelines (WQMG), within the Program Level, will clearly define who is responsible for specific permit components, and when, where and how each linkage will take place (see the discussion below). This guideline is intended to dovetail into the District's current quality assurance and quality control to assure that CERP Permits are efficient, consistent, and accurate and that the final reporting process is sufficient and timely.

Since an important component of this CERP Permit WQMPP is the final reporting to FDEP, tracking compliance, incorporating feedback and optimization the WQMPP will be central to the responsibilities of the primary individuals or groups identified in the CERP Permit WQMG.

STEP 3

The Project Level comprises the necessary tasks and documentation that is required for data collection. This level is the third step of the CERP Permit Water Quality Monitoring Plan and is divided into three (3) phases; planning, implementation and assessment as related to the processing of data (See Figure 36: The Permit Data Life Cycle).

The Planning phase within this level is where decisions are made as to what type, quantity, and quality of data will be required. As already stated, to reach the overall goal of the CERP Permit, the early development of the Water Quality Sampling Plan is integral to this process.

The WQ Sampling Plan will detail the permit's Data Quality Objectives which address pertinent environmental and regulatory issues, the decision rules that apply the limits of the decision rule, and any options for sample optimization. Without this level of detail, the implementation of water quality sampling and the final assessments of the data will be insufficient to determine the compliance test of the permit.

It should not be surprising that the time and effort expended in the planning phase will likely be the most consuming and contentious. However, having these details worked out before the sampling begins will ensure that the planning, implementation and assessment of water quality data collected will meet permit requirements in the most cost and time effective manner.

To support this effort, an initial survey of stakeholders' interest and concerns will be incorporated into the Draft WQ Sampling Plan. It is recommended that the CERP Permit Supervisor tasks the CERP Project Manager to lead this effort and meet these requirements. This person's responsibilities will be written into the CERP Permit WQ Management Guidelines (WQMG).

STEP 3A

The CERP Permit Water Quality Survey is the first component of the planning phase, focusing the varying and sometimes conflicting interests of the stakeholders into a logical order from which to detail pertinent environmental and regulatory issues. If there are requirements for compliance that are identified by this survey, then the statistical methods and the reporting format must then be clearly defined in the Data Quality Objectives (DQOs) and in the subsequent permit WQ Sampling Plan. Since these DQOs must also include the decision rule, the time period over which the test will be used, and the reporting mechanisms for the results, complete implementation and completion of this survey step is crucial.

The questions to be answered are as follows:

a) Identify the problem and compliance. While most sampling plans wait until after the data are collected and analyses are complete to reach a decision, this is contrary to the concept of 'planning'. *The decision on whether or not data collected meet the established criteria test within the permit cannot be made unless these criteria tests are clear and fully identified before a sampling plan is started.* The criteria selected by the PDT should be able to pass a simplicity test.
   - Is the overall sampling design appropriate to the regulatory rule? For example, is the design appropriate to compliance monitoring or is the scope expanding to include data collection designed to determine trends or environmental impacts? These are vastly different designs that are not appropriate for regulatory monitoring programs.
   - Is the request of sampled parameters directly applicable to the work encompassed within the project? If the project is designed only as a reservoir, for example, monitoring to provide assessment of treatment efficiency is clearly outside the scope of the project.
   - Will the frequency and seasonality of the sampling requested provide sufficient data for any compliance test that may be included in the permit? For example,

a 12 month rolling average for samples that are only taken on a bi-annual frequency is inappropriate.

- Does the sampling design match the compliance test? For example, taking monthly TP samples at two pump stations can not used to determine a Student T-Test compliance test between the two sets of data.
- Are the sampling locations, parameters and frequency optimized with respect to access and efficiency for all sampling programs within the District? This optimization can be further refined when the Pre- Monitoring Water Quality Assessment is completed before the draft Sampling Plan is submitted.

b) Identify the inputs to the decision. The inputs into the decision will based, in part, on the current regulatory requirements. For example, will a numeric or a narrative water quality standard be the basis for compliance? Review of baseline or background data that may be applied to the criteria can also be used as inputs into the decision. The use of already established Standard Operating Procedures (SOPs) for permit projects such as Aquifer Storage and Recovery (ASRs), Stormwater Treatment Areas (STAs), Reservoirs, and Hydrologic Restoration will be used as a basis for initial inputs into this decision process.

c) Define the boundaries. The boundaries of the Data Quality Objectives shall include the spatial range of the data sampled as well as the frequency of sampling and any dry/wet season variability. The established level of required precision, accuracy, reproducibility and comparability will be included.

d) Establish a decision rule. This includes a simple 'if /then' statement that will be based on the inputs into the decision and the boundaries. For example, "if the numeric standard of 10 ppb for TP is exceeded at more than 50% of the sampled location within the wet season, then the permit will be considered out of compliance.' This rule must be linked in a tangible way to the data and to the Permit requirements. It must also be included within the performance reports and Pre-and post-water quality assessments.

e) Optimize the Design. Allowing for the entire process to be optimized is very important to the success of the project. This information can come from the performance reports and/or from feedback from FDEP or other stakeholders.

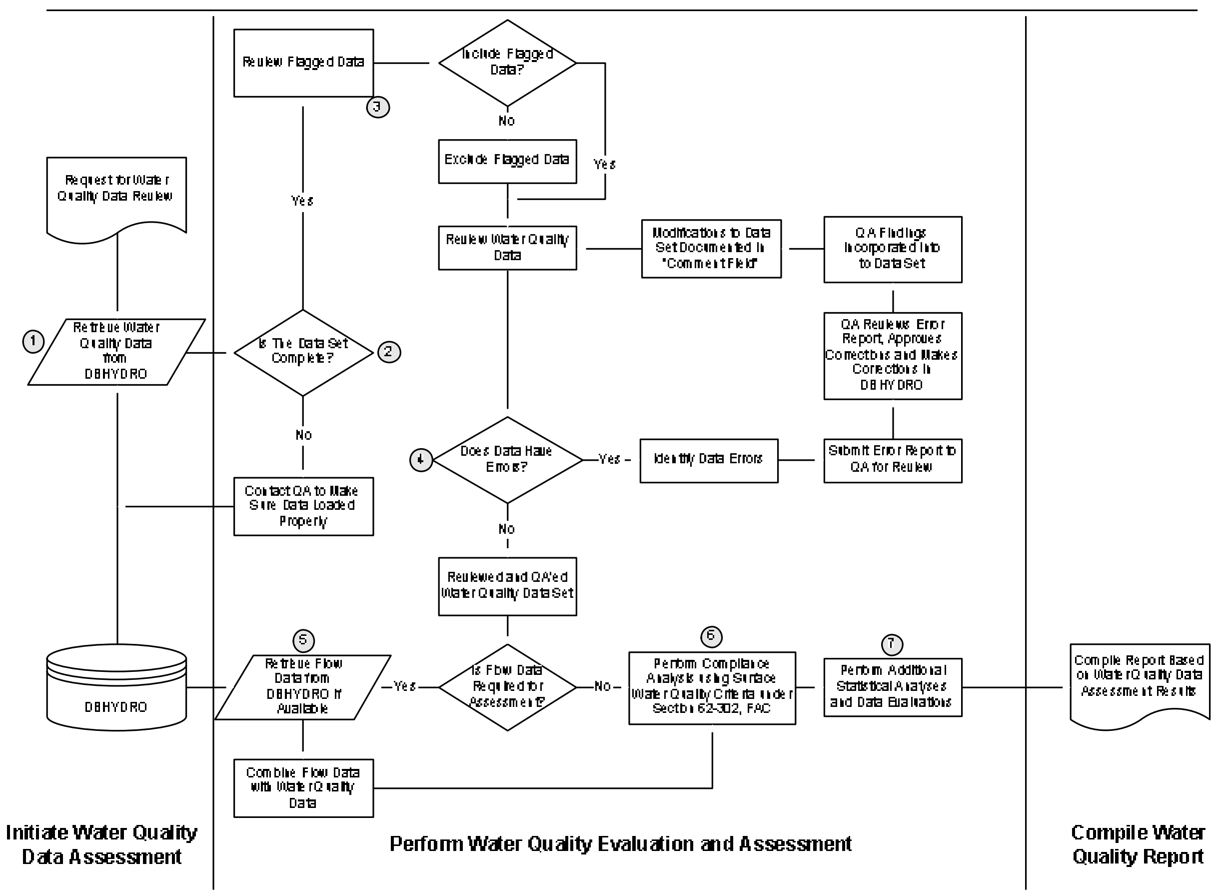
STEP 3B

Data Quality Objectives (DQOs) are results of systematic planning (i.e., CERP permit water quality survey step) and design processes that help to define the problem (and the limitations) needing investigation. It is the Data Quality Objectives which detail the type, quantity and quality of data needed. These objectives will also then be incorporated into the Permit's Water Quality Sampling Plan (WQSP).

The DQOs will ensure consistency and compliance to permit requirements in that they will list all the parameters to be sampled, the frequency of sampling, the level of precision necessary (MDLs and PQLS), the level of QA/QC (Splits, Replicates, etc.) and the data reporting process.

STEP 3C

Once the DQOs highlight the desired sampling goals, the next step is to perform the Pre-Monitoring WQ Assessment which will allow for even more sampling optimization. By reviewing similar data sets from like projects, parameters may be dropped, changed or minimized to optimize sampling. For example, if the DQOs include the sampling of chloride for inflows versus outflows for a new Stormwater Treatment Area (STA) and previous data sets show no relative differences, there may be an opportunity to exclude this parameter from the



Request for Water Quality Data Review
1
Retrieve Water Quality Data from DBHYDRO
DBHYDRO
Review Flagged Data
3
Include Flagged Data?
No
Exclude Flagged Data
Yes
Yes
Is The Data Set Complete?
2
No
Contact QA to Make Sure Data Loaded Properly
Review Water Quality Data
Modifications to Data Set Documented in "Comment Field"
QA Findings Incorporated into to Data Set
QA Reviews Error Report, Approves Corrections and Makes Corrections in DBHYDRO
4
Does Data Have Errors?
Yes
Identify Data Errors
Submit Error Report to QA for Review
No
Reviewed and QA'ed Water Quality Data Set
5
Retrieve Flow Data from DBHYDRO if Available
Yes
Is Flow Data Required for Assessment?
No
6
Perform Compliance Analysis using Surface Water Quality Criteria under Section 62-302, FAC
7
Perform Additional Statistical Analyses and Data Evaluations
Compile Report Based on Water Quality Data Assessment Results
Combine Flow Data with Water Quality Data
Initiate Water Quality Data Assessment
Perform Water Quality Evaluation and Assessment
Compile Water Quality Report

- Across multiple monitoring projects
- For a variety of monitoring years (from several years to the Period of Record)
- For multiple parameters (field, nutrient (calculated and non-calculated), metals, etc.)

Item 1. Retrieve Water Quality Data from DBHYDRO

- Water quality data is retrieved from DBHYDRO using SQL, MS Access, or Excel DBHYDRO Browser.

Perform Water Evaluation and Assessment:

Item 2. Is The Data Set Complete?

- Are all stations included?
- Are all dates included without "significant" gaps?
- Are all chemical parameters of interest included?

Item 3. Review Flagged Data

- Are data qualifiers applicable to the data quality objectives? For example, are holding times met under the FDEP expanded holding time criteria, but data were flagged?

Item 4. Does Data Have Errors?

- Are sample identifications correct?
- Is all field parameter data for estuarine sample types 3 and 4 present? If salinity data are missing, use standard equation to calculate values.
- Do all samples collected on a one-day trip have the same dates?
- Do all routine samples collected at one station on one date have the same collection times?
- Are there outliers for field or chemical data? (Examples: Are temperature values <10 and >35°; conductivity values <100 µS/cm; dissolved oxygen <2 and >15 mg/L; pH <2 and >10?)
- Are field and lab conductivity measurements reasonable?
- Are Secchi depths > total depth at any station?
- Are the minimum and maximum values for field or chemical parameters consistent with historical data?
- Is there no duplication of field parameter data for samples analyzed by more than one laboratory?
- Are no samples duplicated (i.e., are they loaded twice)?
- Verify that the total anion charge is 80-110% of the total cation charge if the conductivity is >100 µS/cm.
- Check data for reversals, where: OPO4>TDPO4>TPO4, VSS>TSS, TDKN>TKN, NO2>NOX, NH4>TKN.
- Was a hardness value calculated from Ca and Mg? Hardness is necessary to perform compliance analysis for some trace metals based on Section 62-302, FAC.

Item 5. Retrieve Flow Data from DBHYDRO if Available

- Identify correct DBKeys for appropriate monitoring stations, the following hierarchy should be used for most flow data retrieval:
    - Select RECORDER type as PREF for Preferred DBKey, if PREF is not available,

- o Select RECORDER type as MOD1 (this data only available through 2000), if MOD1 is not available,
  - o Select RECORDER type as TELE, if TELE is not available,
  - o Select RECORDER type as CR10, if CR10 is not available,
  - o For any other RECORDER type, the following hierarchy should be used for AGENCY type:

  WMD > USGS > COE> other agencies

(confirm this hierarchy with engineer familiar with flow station)

Item 6. Perform Compliance Analysis using Surface Water Quality Criteria under Section 62-302, FAC, and Data Quality Objectives as defined in CERP Water Quality Monitoring Plan

- Calculate unionized ammonia using "Calculation Of Unionized Ammonia In Fresh Water Storet Parameter Code 00619", Florida Department Of Environmental Protection Chemistry Laboratory Methods Manual, Tallahassee (2/12/2001)
- Perform analysis by station and parameter (perform these analyses for samples collected under flow conditions and samples collected regardless of flow conditions)
- Compare total number of samples collected with number of samples exceeding State Standards
- Summarize information

Item 7. Perform Additional Statistical Analyses and Data Evaluation as indicated by the data quality objectives

- Trend Analysis
  - o Regressions – Parameter versus time determine significance ($p<0.05$) and check for autocorrelations. This analysis will provide information regarding long term increases or decreases in constituent concentration.
  - o If data is autocorrelated, then use Seasonal Kendall Tau test
- Inter-Parameter Correlations
  - o Determine if some parameters are redundant for analysis because they are correlated to another (i.e., total dissolved solids vs. specific conductivity). Use prediction intervals to determine the error of correlation.
- Inter-Station Comparisons
  - o If looking at Inflow and Outflow stations (n=2), use simple t-test (if data is normally distributed) or Mann-Whitney (for data that is not normally distributed)
  - o When more than two stations are required in the comparison, use Analysis of Variance (for normally distributed data) and Kruskal-Wallis (for not normally distributed data).

Compile Water Quality Report:

- Use results from water quality evaluation and assessment to summarize the appropriate parameters and frequencies required to accomplish Permit objectives.

It is important to understand that for the CERPRA Permit process this assessment should be completed before the monitoring program is established. It is identified as a post-monitoring assessment process as well because it represents the technical steps taken by the POP Team in evaluating the data from the existing monitoring networks. The Team feels strongly that this process should be implemented on a re-occurring basis to ensure that the District is not collecting duplicative or non-essential information and hence wasting key fiscal and human resources.

STEP 4

The Permit Water Quality Sampling Plan (WQSP) details the management, personnel, schedule, policies and procedures for the specific data collection project. Where necessary, the WQSP includes (or refers to) Standard Operating Procedures (SOPs). These SOPs ensure that data are collected using approved and documented protocols and quality measures.

The Permit WQ Sampling Plan will include stakeholders' interests, the results from the Permit Survey, a set of established DQOs, and recommendations or summaries from the Pre-Monitoring WQ Assessment. Since this initial process included the stakeholders, the results should be acceptable to all stakeholders and be sufficient to submit as the Sec. 373.1501 assurances.

STEP 5

The Project Management Team will formulate the Section 1501 submittal to FDEP for approval. This can be accomplished through two options, by documenting all Section 1501 assurances in the Project Implementation Report (PIR) or providing these assurances as a stand-alone document.

STEP 5A

The first option will be through the PIR and includes not only the WQ assurances as included in the Permit Monitoring Plan but any other assurances that are required in the Sec. 373.1501 (5A-5E).

STEP 5B

The alternative step is the preparation of a stand-alone document which is submitted to FDEP in lieu of the PIR to satisfy Section 373.1501. This option also includes the same WQ assurances as included in the Permit Sampling Plan and any other assurances that are required the Sec. 373.1501.

STEP 6A & 6B

The Submittal to FDEP may involve a series of negotiations with respect to the proposed monitoring program. However, it is expected that this will be minimized subject to the completeness of effort put into the planning process ahead of these submittals. It is important that any additional requests or changes to the recommended WQ Sampling Plan go through the same steps (the planning phase) to ensure completeness, efficiency and optimization. Any changes that may be made to the Water Quality Sampling Plan must including the process used and consensus reached and recorded for the entire implementation and assessment cycle. This step involves the actual submittal to FDEP of the Sec. 373.1501 (5A-5E).

STEP 7

Once FDEP approves, the CERPRA 373.1502 permit application may commence and be submitted to FDEP.

STEP 8

Permit Monitoring Compliance work can now be processed throughout the District's water quality monitoring and assessment programs. This may entail coordination through numerous Divisions and Departments within the District for the installation of equipment, infrastructure, electronic equipment, dataloggers, data transfer, etc. Because of the complexity of this coordination, a final review by key members of the PDT or other stakeholders should take place to ensure concurrence to the WQ Sampling Plan once the work plan is completed.

STEP 9

The Permit water quality monitoring can now begin based on the final Data Quality Objectives (DQOs) coupled with any quality system, structures, procedures and standard operating procedures already in place within the overall District's QA/QC programs.

STEP 10

This step is where most of the District's technical assessments for the resulting water quality data will take place. Many of the established documents such as the SFWMD Field Sampling Manual and the SFWMD Lab Manual as well as any applicable CERP Guidance Memorandums (CGMs) will provided the details necessary to ensure that the Permit's Data Quality Objectives are being met and the Permit WQ Sampling Plan is being correctly applied. Any resulting reports based on these technical assessments will be then be documented and included in the final reports that are sent to FDEP.

STEP 11

Performance reports will not only include these QA/QC technical assessments but also incorporate assessments specific to the Data Quality Objectives such as the criteria for the decision rule or other compliance issues.

STEP 12

The last step to ensure that all necessary data are properly and completely assessed is to perform the Post-Permit Water Quality Monitoring data assessment. This additional information is especially needed to determine whether the Permit has met its overall goals and to ensure that the planning, implementation and assessment of water quality data collected will met its Permit requirements in the most cost and time effective manner. This step is vital for the optimization effort of the District's overall Permit Plan.

STEP 13

This is the final submittal of the report to FDEP for recommendations or feedback.

STEP 14

The feedback mechanism is expected to initiate from FDEP to the permit monitoring compliance to the actual water quality monitoring and back to the planning phase to optimize the sampling plans. It is expected that any such changes or suggestions will be documented.

C. CERP Permit Water Quality Management Guidelines

It is apparent that the success of this permit program will be dependent upon a clear outline of responsibilities. The CERP Permit Water Quality Management Guideline (WQMG) is written to give the outline of tasks and responsibilities for the planning, implementation and assessment of Permit data. This guideline is being proposed as policy and procedure for establishing the internal District management processes to ensure the establishment of effective monitoring networks in association with obtaining the CERPRA permit.

Goals and Objectives

The goal of CERP Permit WQMG is to clearly define who is responsible for specific permit water quality components, and when, where and how each linkage will take place. This objective of the Guideline is to efficiently manage, review and report data collected throughout the span of the CERP permit by dovetailing into the District's current quality assurance and quality control programs and resources.

CERP Permit Water Quality Management Responsibilities

It is the policy of the SFWMD that there shall be adequate planning, execution, oversight, and evaluation of all aspects of monitoring conducted in conjunction with CERP permitting activities. This planning and oversight is intended to ensure appropriate and cost effective monitoring. The CERP Permit WQ Management Guideline outlines tasks and responsibilities for the planning, implementation and assessment of permit data and therefore is a primary task within the WQ monitoring plan.

CERP Permit Program Director

The CERP Permit Program Director is responsible for the implementation of the overall CERP Permit Water Quality Monitoring Plan (see Figure 37.). This position directly supervises the CERP Project Manager and the CERP Compliance Specialist. Duties include:

- Design CERP Permit Tracking Documents for each project that incorporates the above processes, products and timelines. The schedule and delivery for providing this tracking shall be defined in the Permit WQ Monitoring Plan.

CERP Project Manager

The CERP Project Manager will, among other responsibilities, ensure the goals of the CERP Permit Water Quality Monitoring Plan are met through the coordination and program requirements of the CERP projects. This effort includes the planning, implementation and review of water quality sampling plans throughout the entirety of the CERP project. The duties of this position include:

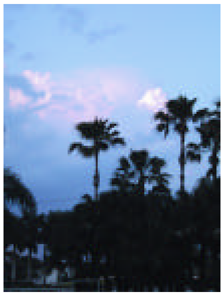
- Coordination and ensuring appropriate team members with the Project Development Team (PDT) in the initial stages of a CERP Permit and the subsequent CERP WQ Sampling Plan.
- Instructing the PDT on the goals and objectives in the CERP Permit Water Quality Monitoring Plan and on the development of the CERP WQ Sampling Plan (CWQSP). This may entail presentations, demonstration of existing CERP permits, etc.
- Introducing concepts within the WQMP that the PDT will be using to determine a WQ sampling plan. These include;
    - SOPs associated with specific projects like STAs, ASRs, etc.,
    - The CERP Permit Survey processes,
    - Data Quality Objectives,
    - Water Quality Assessments, and
    - Water Quality Sampling Plans.
- Demonstrating through examples of each concept listed above.
- Assisting the PDT in producing related documents and products. These include; SOPs, the Project's Survey results, the related Data Quality Objectives, the Pre-Water Quality Assessment results, the Draft Water Quality Sampling Plan.
- Design CERP Permit Tracking Documents for each project that incorporates the above processes, products and timelines. The schedule and delivery for providing this tracking shall be defined in the Permit WQ Monitoring Plan.

- Formalizing the draft WQ sampling plan that will be submitted to FDEP either through the PIR or ahead of the PIR.
- Scheduling, facilitating and documenting meetings in the development of the CWQSP.
- Coordinating in the development and submittal of any performance reports, water quality assessments, compliance reports or relevant feedback as defined in the CERP Permit Water Quality Monitoring Plan.

CERP Permit Compliance Specialist

This position is responsible for meeting the CERP Permit monitoring goals in an efficient, consistent, and accurate manner. The CERP Permit Compliance Specialist will, among other responsibilities, ensure the goals of the CERP Permit Water Quality Monitoring Plan are met through the coordination and program requirements of the CERP projects. This effort includes the implementation, assessment, tracking and reporting of water quality monitoring throughout the entirety of the CERP project to ensure compliance with the CERP Permit. The duties of this position include:

- Coordination with the Project Development Team (PDT) in the initial stages of a CERP Permit and the subsequent CERP WQ Sampling Plan.
- Closely working with the CERP Project Manager throughout the planning and submittal stages of the WQ Sampling Plan to ensure consistency with the PDT's Data Quality Objectives.
- Coordinating with District's Divisions (H+H. ESDA, EMA, etc.) to ensure consistency in work requests, work products and related data as related to the final WQ Sampling Plan. These work requests and work products shall be included as an Appendix to the Project's WQ Sampling Plan.
- Incorporating and/or redesigning current performance reports from the EMA Department for QA/QC related issues to meet the Permit's Data Quality Objectives. These Performance Reports shall be included as an Appendix to the Project's WQ Sampling Plan.
- Coordinating in the development and scheduling of the Pre and Post-Water Quality Assessments as defined in the CERP Permit Water Quality Monitoring Plan. These Water Quality Assessments shall be included as an Appendix to the Project's WQ Sampling Plan.
- Reviewing and reporting the results of the above Assessments as scheduled.
- Design CERP Permit Tracking Documents for each project that incorporates the above processes, products and timelines. The schedule and delivery for providing this tracking shall be defined in the Permit WQ Monitoring Plan.
- Compiling the Permit Compliance Reports for submittal to relevant District Departments, the CERP Project Manager and CERP Permit Program Director and finally to FDEP. These reports may include the Water Quality Sampling Plan and Appendixes and the Permit Tracking.
- Ensuring feedback mechanisms are complete.
- Providing written documentation of any feedback, recommendations or data gaps that may affect the efficiency of the planning, implementation or assessment of water quality data.



Section 6
WEB-BASED TOOL FOR PERMIT-REQUIRED MONITORING

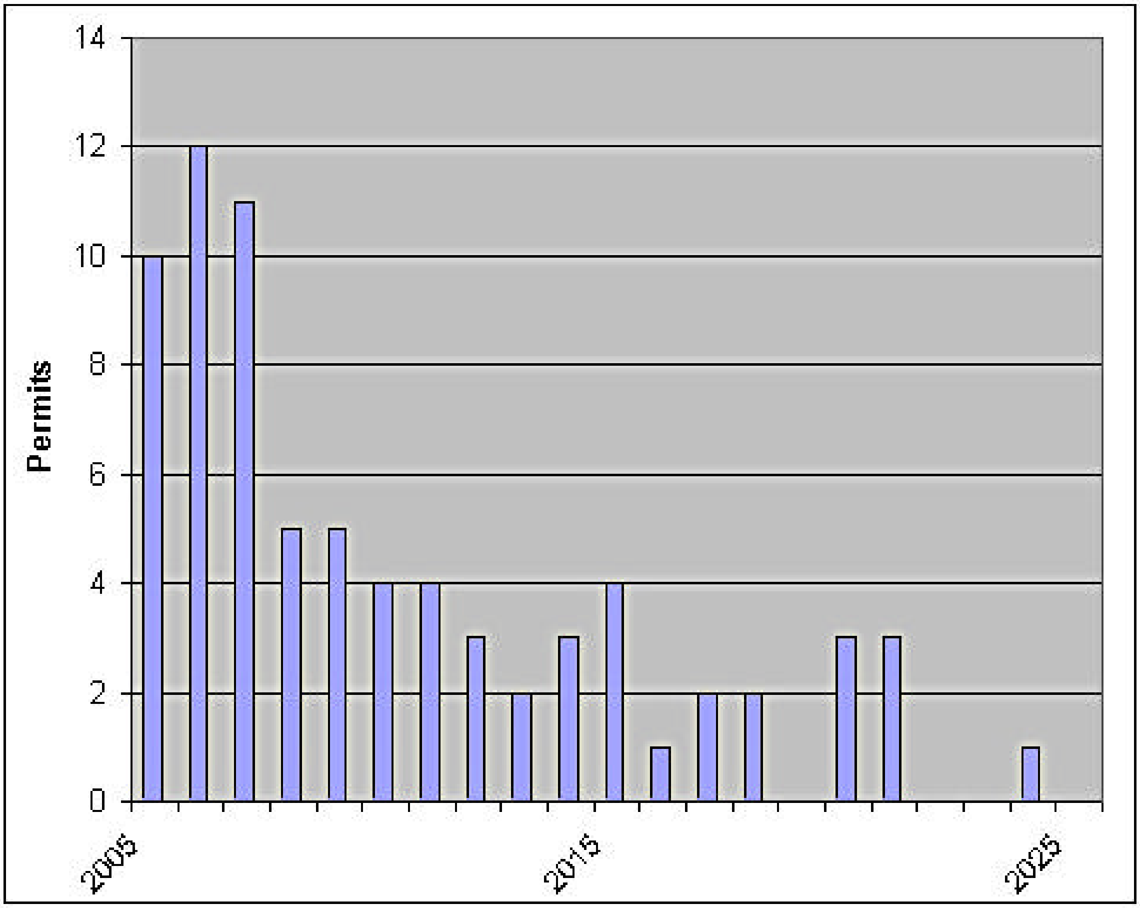
The analysis of intra-District GIS capabilities and databases highlights a very strong interest in pursuing and using GIS capabilities to support the functions and administration of the District in support of CERP operations. The *web-based tool for permit-required monitoring* (see Figure 40) is designed to provide citizens, scientists, teachers, and students access to a vast amount of information and monitoring data for all the permits that the District holds. The District currently holds 39 permits. This number will increase as permits for the CERP projects are obtained. Using a linkage to the District's DBHYDRO browser, data can be accessed by station or site name, x-y coordinates, basin name, county, etc. However, information on the permit-required monitoring alone cannot be obtained. This web site will provide access to the DBHYDRO database directly through a geospatial (map) interface, which delineates the different permits' areas and their monitoring sites. It also provides the user with information such as the permit itself, project manager, monitoring sites, type of monitoring required by the permit, modifications to the permit, etc. Thus, this web site will simplify and streamline the data access process based on the permits and their required monitoring.

Figure 40: Web-based GIS Tool for Permit-Required Monitoring

This tool will aid in planning future monitoring programs, as it would make the process of decision-making for new monitoring sites more effective and would clearly help eliminate potential duplication. The continuation of this development effort and its update and maintenance should be included in the FY05 budget.

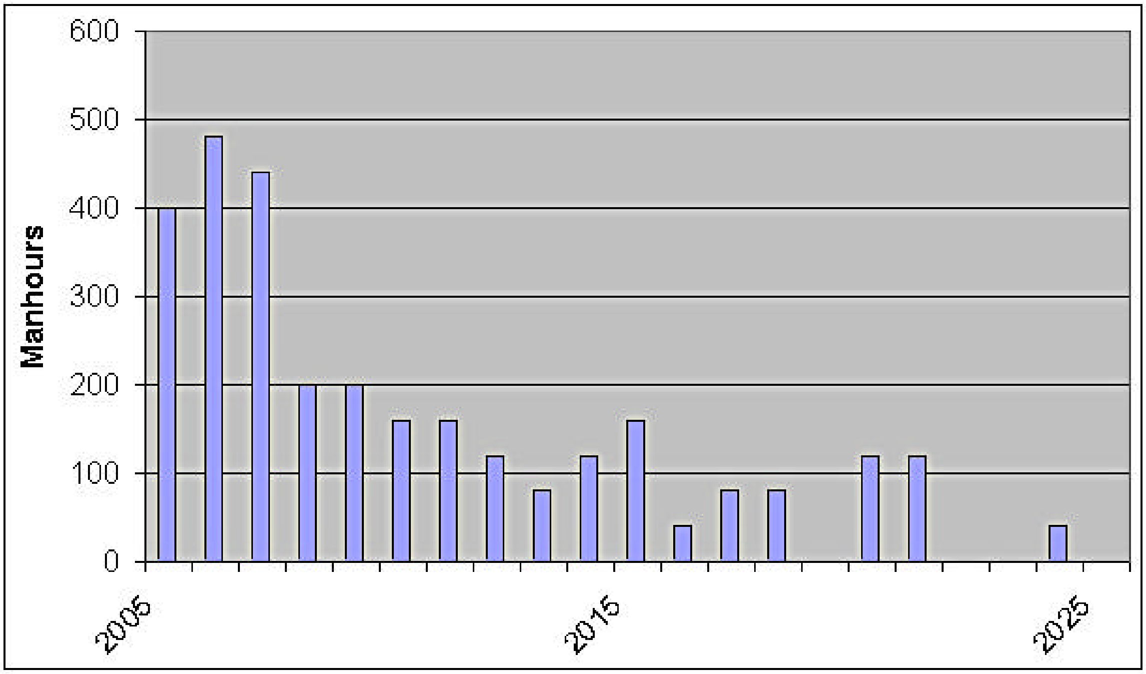
It is currently estimated to take approximately one work-week, 40 hours, to construct the necessary maps and linkages per permit. Applying this factor to the anticipated permit workload for CERP projects can give the District a good idea of the total FTEs required for maintenance of this system. Included in Appendix 3 is the CERP project master implementation schedule as of the writing of this report. Included are designations indicating when the permit acquisition processes should be initiated in accordance with the planned construction sequencing. Figure 41 shows how many permits per year the District must obtain for the CERP program. They must obtain approximately 50 permits over the next five years.

Figure 41: CERP Permits Required Per Year

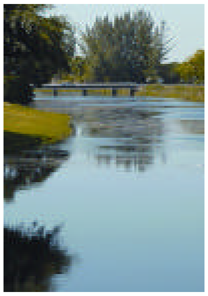


In order to serve the needs of the District's permitting staff, Figure 42 gives the annual work-hour requirements for implementation and continued maintenance of this web-based GIS tool.

Figure 42: Annual Time Requirement for System Maintenance



The time required to support this tool peaks in FY06 at about 0.25 FTE, or ~ 500 hours.



Section 7
RECOMMENDATIONS AND ACTION ITEMS

Recommendations

It is recommended that the District submit requests for permit modifications for the permits issued by DEP for the six permitted projects identified in detail in this report. The modifications requested would be two-fold: first, reduction in the identified parameters and sites; and the second modification, which would occur in a year after completion of the demonstration project, of the weekly sampling requirements to bi-weekly.

It is recommended that the District allocate the necessary resources to maintain the web-based tool for permit monitoring networks. It is recommended that the CERP permit acquisition staff be trained on how to utilize the tool for upcoming CERPRA permit applications.

It is recommended that the CERP WMQPP be implemented as a process for ensuring all necessary water quality components, coordination and products for a CERP permit will be planned, implemented and assessed. It is also recommended that the District, USACE and FDEP meet to discuss and evaluate this process for permitting CERP projects.

Action Items

The following actions should be undertaken by District staff as soon as practicable:

1. Submit this report to the Florida Department of Environmental Protection for their review.
2. Hold a joint discussion with the FDEP as to the preferred process for permit modifications of monitoring networks.
3. Submit Requests for Modification to the FDEP for the permits identified in this report. Specifically, request the removal of the continued monitoring requirement for the following parameters for the identified projects:

Recommended Parameter Reductions

	Alkalinity	Chlorides	Total Dissolved Solids	Total Dissolved Phosphorous	Total Dissolved Nitrogen	Turbidity	Sulfate	Orthophosphate	Ammonia	Total Suspended Solids	Dissolved Calcium	Dissolved Magnesium	Dissolved Potassium	Dissolved Sodium	Silica	Total Iron	Color	Nitrite	Hardness	Total Cadmium	Total Copper	Total Zinc	Detergents	Zinc Phosphate	Site S-14	Site S-175	Site S-332
STA 1W	O	O	O	O	O	O	O	O	O																		
STA 2	O	O	O	O		O	O	O	O																		
STA 5	O	O	O	O	O	O	O	O	O																		
STA 6	O	O				O	O	O	O	O	O	O	O	O	O	O	O										
Non-ECP	O	O					O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Holeyland	O							O	O		O	O								O	O	O					

4. Request FDEP to consider in the future a reduction in frequency of sampling for all of these permits from weekly to bi-weekly upon successful completion of the demonstration project.
5. Request FDEP concurrence with the reductions recommended herein for the Mercury and Pesticide Monitoring Programs.
6. Set up a training program for CERP permitting staff on the use of the web-based tool for permitting.
7. On a bi-annual basis implement the Water Quality Data Assessment process for all District permits to ensure optimized permit monitoring networks.
8. Meet with FDEP and the USACE to discuss and evaluate the CERP WQMPP process as a guideline for CERP Project Managers